

MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 11

September, 1938

Number 4

CONTENTS

JOHN G. GARDNER
President and
General Manager

JOHN M. KRINGS
Advertising Manager

G. M. FILLMORE
342 Madison Ave.,
New York
Murray Hill 6-3899

J. H. KOCH
431 Main St.
Cincinnati, O.
Main 0182

GEORGE H. MEYERS
Home Tower, Chicago
Superior 8329

Member



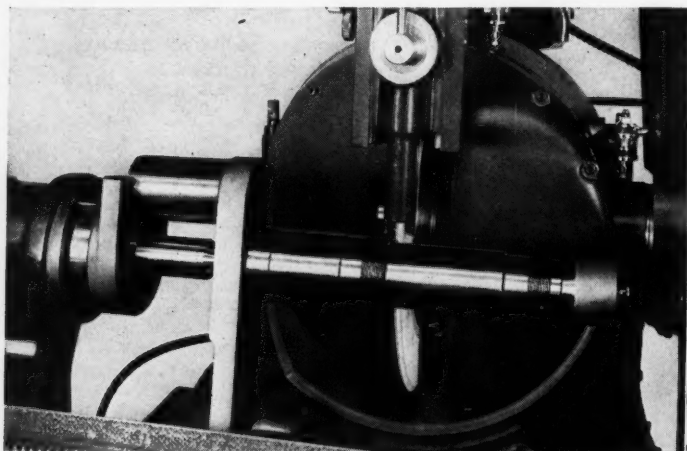
Producing Modern Machine Tools by Modern Methods..... By BARTLETT WEST	41
What Do You Know About High Frequency Electric Tools?..... By G. H. Du SELL	50
Method of Constructing Time Study Formulas and Tables of Standard Data at East Pitts- burgh Plant of Westinghouse Electric and Mfg. Co., Ill..... By G. A. BAESLACK	60
Grinding Rubber Printing-Press Rollers..... By L. H. HOUCK	74
IDEAS FROM READERS—	
—Planer Attachment for Contour Cutting..... By RAY G. PINKALLA	86
—Grinding Right and Left Hand Tungsten Carbide Tools..... By E. W. DAUM	92
—Trepanning Tool for Sheet Stock..... By W. M. HALLIDAY	94
—Two "Belt Lap" Kinks..... By W. F. SCHAPHORST	102
Over the Editor's Desk.....	106
New Shop Equipment.....	108
Catalog Library	194
"There's One in Every Shop", by Wesser.....	196
Services Directory	197
Index to Advertisements.....	198

Published monthly by Gardner Publications, Inc., 431 Main St., Cincinnati, Ohio. Copyrighted.

Circulation More Than 29,000 Each Issue

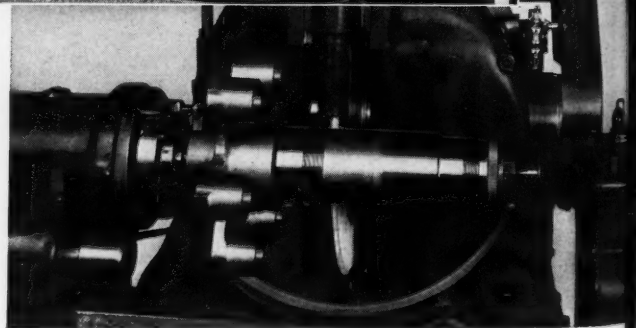
THREADS

Ground from the solid
QUICKLY——ECONOMICALLY



Grinding
threads on
airplane
engine
crankshaft

Grinding
threads on
airplane
engine
propeller
shaft.



JONES & LAMSON MACHINE COMPANY

MODERN Machine Shop

CINCINNATI, OHIO

SEPTEMBER, 1938

VOL. 11, No. 4



Producing Modern Machine Tools

by Modern Methods

*This Machine Age Machines Perform Pretty Nearly Every
Task Imaginable but Machine Tools are the Only Machines
Which Can Reproduce Themselves.*

BY BARTLETT WEST

THE present era in world history is popularly termed the "machine age." Actually, it is only the beginning of the machine age. The developments of the past thirty years have convinced mankind that there are practically no limits to the application of power, and the future will see the application of power to all kinds of

tasks that are now considered laborious, tiresome, and undesirable for many other reasons.

Practically all of the major accessories of life are produced with the aid of machines. All textiles—wool, cotton, or silk—are woven or knitted in power-driven machines; clothing is made with the aid of machines; leath-

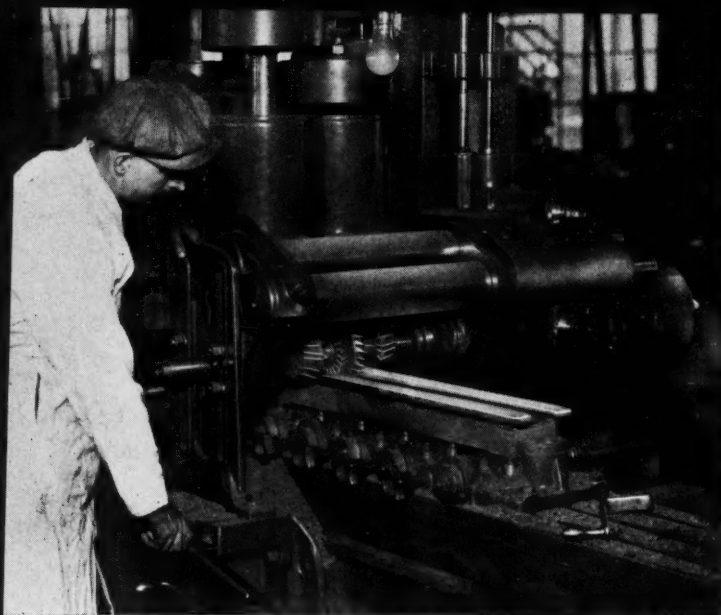


Fig. 1—Eight faces of lathes being milled simultaneously in this Milwaukee Simplex milling machine.

er is processed by machinery and the finished product is fabricated into shoes by machine; our canned foods and cereals are processed and packed by machine; bricks and other building materials are made by machine; practically all lumber is finished by machine and machines are, of course, used in the finishing of metals and the production of all of the machines listed above. The metal-working ma-

something about the precision and accuracy of the machine tools with which these units are made. Accordingly, the writer is privileged to present here some of the more important operations in the building of lathes, drill presses, shapers, and other machine tools which comprise the product of the Atlas Press Company, Kalamazoo, Michigan.

The Atlas line of tools is of the so-called "light" type; that is, the machines are designed for work of the smaller sizes up to 10-inch swing. Atlas drill presses will accommodate work up to 10-inch diameter, and Atlas shapers will handle work

chines are commonly known machine tools are the only machines that can be used to reproduce themselves.

Considering precision and accuracy expected of most modern mechanical engineering it should be interesting to know

and is equally important to provide strength. Milwaukee operation is designed to be

is equal to six on the dusted in many deflection. Eight surmounting; for two edges of cutters and spindle and two vertical

ample for the job, as seen from illustration chatter and are avoided.

To insure the ways of the lathe bed perfectly absolutely even with

Fig. 2—Accuracy in the ways is insured by grinding in this special surface grinding machine.

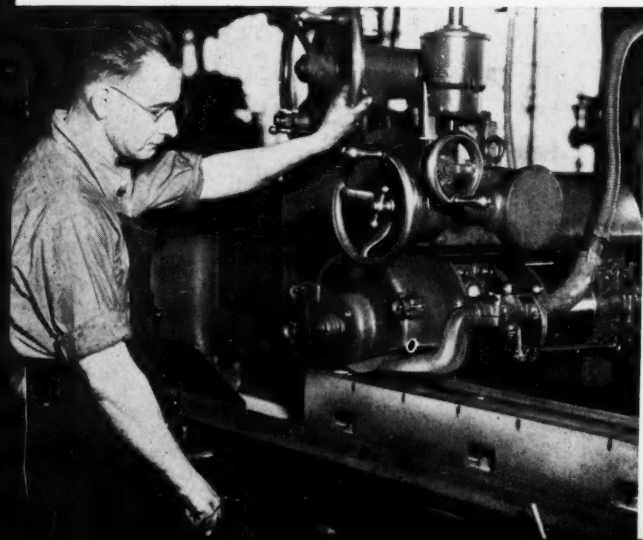


Fig. 3—Spindle holes for bearings in this horizontal stock for

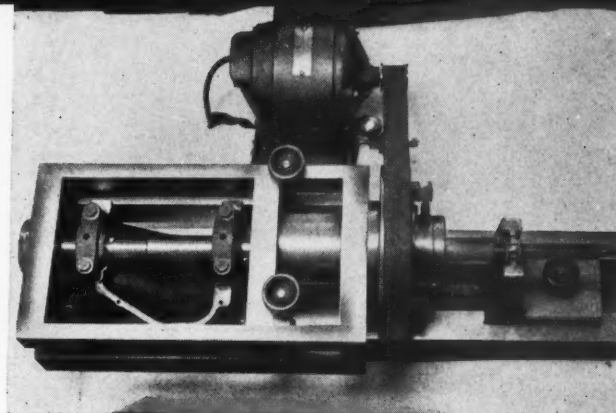
Fig. 4—Spindle holes for stock for

Eight
lathe
simultane
Milwaukee
milling
chine.

are co
known
e tools
only
that can
reproduc
ves.

dering
n and
y expect
t mod
cal uni
d be in
to in
n and
pols
Acc
d to p
import
of
ers,
comp
ess C
f the
; that
design
the job, as can be
small
been from the il
ustration, so that
chatter and spring
made
h swi
are avoided.
To insure that
the ways of the
lathe bed will be
perfectly smooth,
absolutely flat and
even with each

Fig. 3—Special line boring machine for boring the spindle bearings in the lathe headstock. This boring is done after the headstock has been fitted to the bed.



other, the ways are ground in the Norton surface grinding machine shown set up for operation in Fig. 2. The spindle of this machine is equipped with two grinding wheels, 10-inch diameter x 1 1/4 inch in thickness. The wheels are trued frequently to make sure that they are exactly the same size. Automatic feed is used, the wheels feeding 0.010 inch at each traverse of the table and removing approximately 0.005 inch of stock in order to obtain the necessary finish and accuracy.

Looking down upon the top of the fixture shown in Fig. 3, we see how the spindle bearings in the lathe headstock are line bored. This boring is

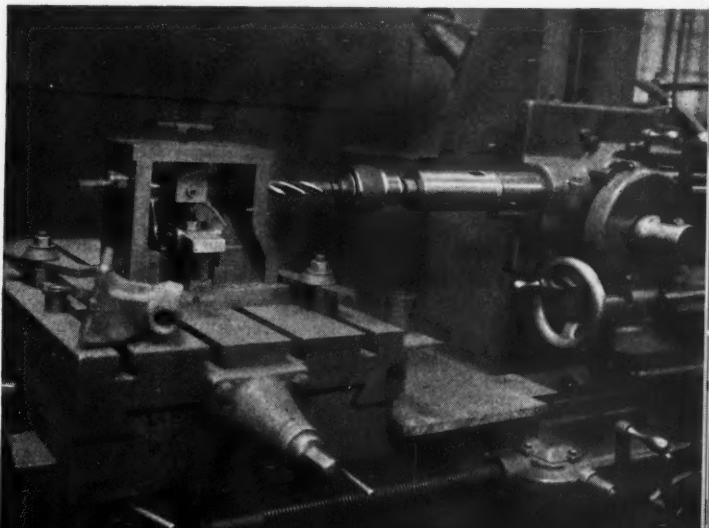


Fig. 4 — Machining spindle hole in tailstock for lathe.

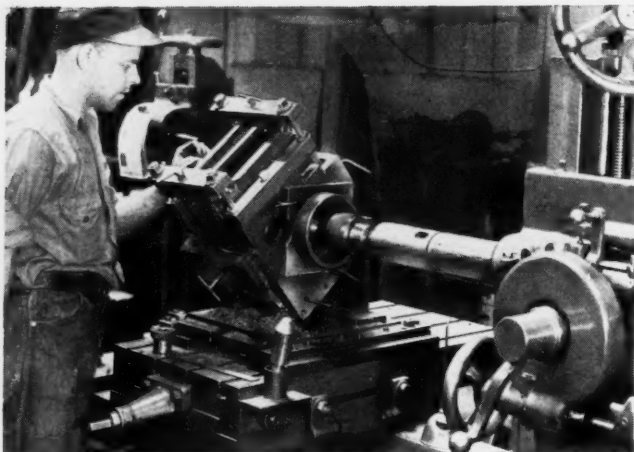


Fig. 5—Line boring and reaming hole in pinion shaft and gear shaft of shaper. Tilted position of fixture simplifies accurate positioning of hole

performed after the headstock has been fitted to the lathe bed, insuring positive alignment of the spindle with the bed ways. Single point cutters are used to bore the bearings. The boring bar is threaded at the right end to provide for 0.015 inch feed per revolution of the bar. Power is supplied by a $\frac{1}{4}$ h.p. motor which drives a spindle through which the cutter bar feeds as it revolves. The bearing holes are held to limits of 0.0002 inch.

The illustration Fig. 4 shows the operation of rough drilling, boring, rough reaming, finish reaming, counter-boring, and tapping the ram spindle hole in the tailstock for lathe. The fixture in

the size of the finish reamer is 1.125 inch. This operation is also performed in a Morris horizontal boring machine.

Fig. 5 shows the line boring and reaming of the pinion shaft hole and bull-gear shaft hole in the column of the Atlas shaper on a Morris horizontal boring machine. Accurate positioning of the two holes is simplified by the tilted position of the fixture; the centers of the two holes remain in a horizontal position.

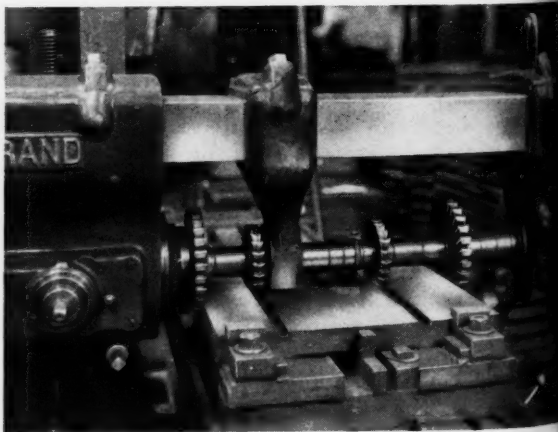


Fig. 6—Machining the sides and miter slots in a saw table. Interlocking cutters provide for accuracy in the width of the slots.

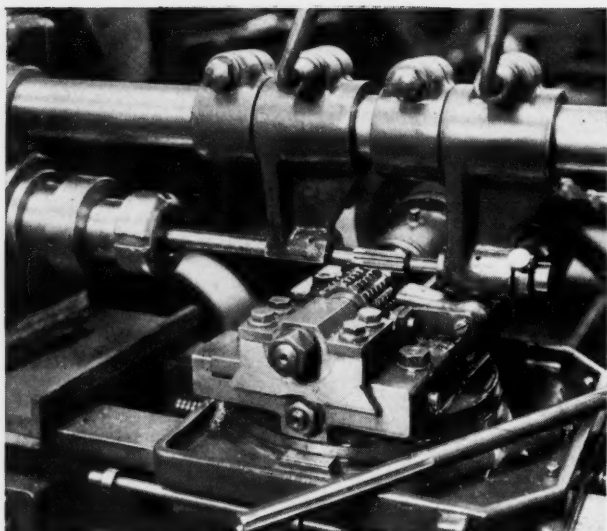


Fig. 9—The splines of the drill press spindle are hobbled, accurately and economically, in this Barber-Colman hobbing machine.

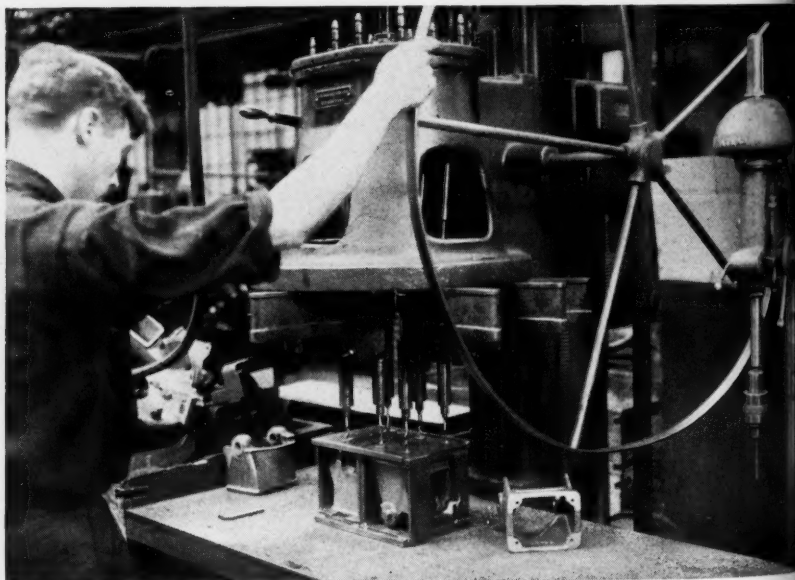
are brought to be under the outer corners of the table are locked in position to prevent deflection of the table under pressure of the wheel. Approximately 0.005 inch stock is removed providing the necessary finish and accuracy.

The splines on the drill press spindle are machined in the Barber-Colman hobbing machine.

locate the table for grinding, it is clamped to the stub column, then pins

drill press spindle are machined in the Barber-Colman hobbing machine.

Fig. 10—Drilling both the base and the top of wood lathe headstock. One piece is completed in each operation.

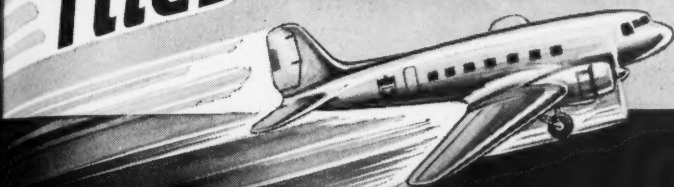
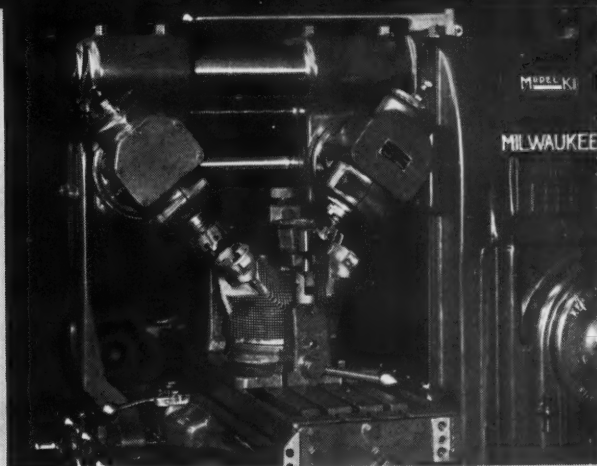


splines
as spindle
urately
in this
hobbing
ne.

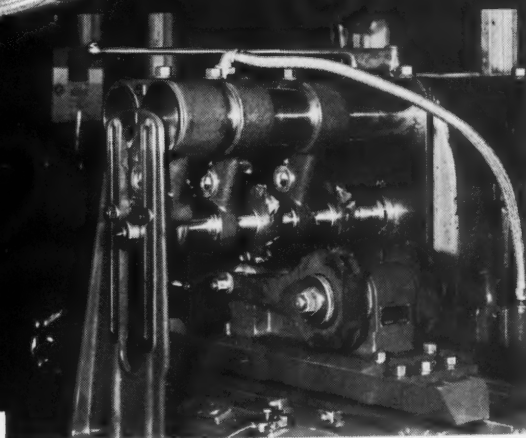
nt to be
outer c
table
in p
revent
the tal
essure
Appro
05 inch
remov
the nea
and

es on
chined
mach
s compl

AN INDUSTRY THAT Flies



MILWAUKEE
Milling Machines
are Easily and Ef-
fectively Adapted
to Air Craft Work



ARNEY & TRECKER CORPORATION
Allis Station **MILWAUKEE, WISCONSIN**

MORE THAN
40 years
OF DOING
ONE THING WELL

Milwaukee **MILLING
MACHINES**



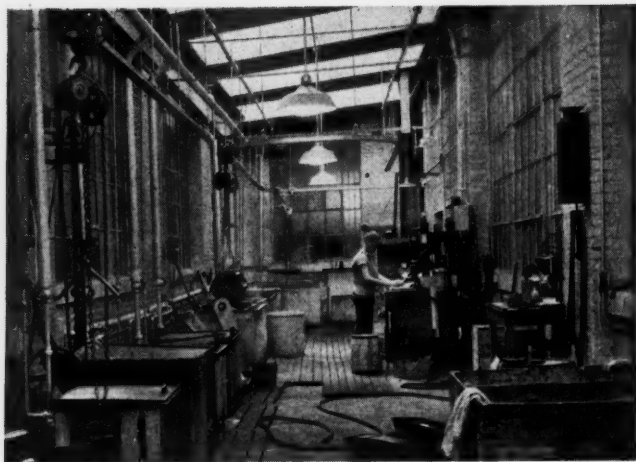


Fig. 11—View of plating department. Parts subject to rust are cadmium plated and other parts chrome plated appearance.

shown in Fig. 9. The spindle is of special steel and the spline of the spindle for a 15-inch Atlas drill press is 5¾ inches long. The spline is milled complete on this machine in two minutes.

Both the bottom holes and the holes in the top of the wood lathe headstock are drilled in one operation in the Natco multiple drilling machine shown in Fig. 10. The jig is built to hold two pieces in reverse positions; thus the four holes in the base and two holes in the top are drilled simultaneously and one complete piece is produced in each operation. A blind

hole is also drilled in the piece, in such a position that it cannot be drilled simultaneously with the other holes.

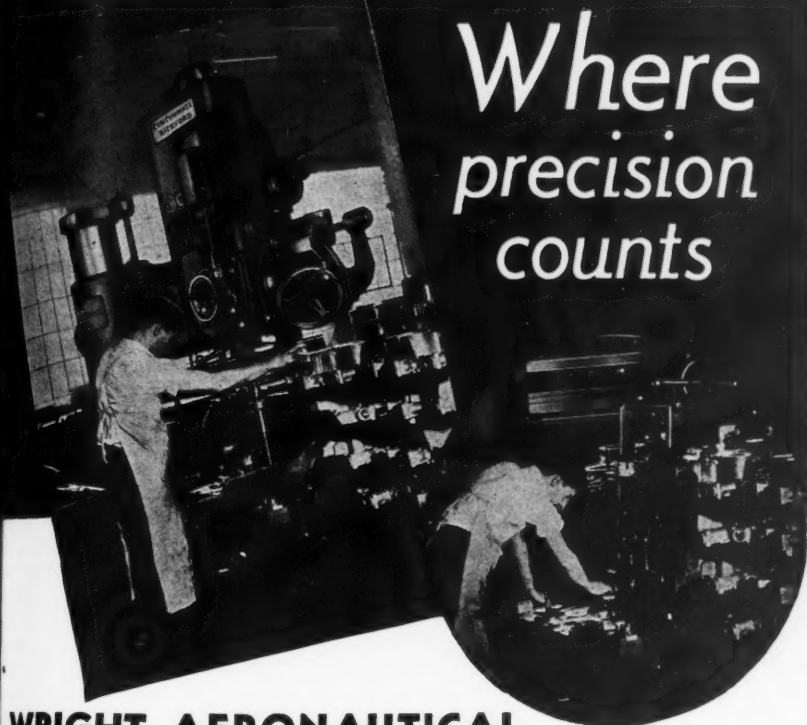
Accordingly, with the Natco in order power, the operator drills the blind hole with the Atlas single drill shown in the right in the illustration. The illustration Fig. 11 is a view of the plating department. All screws, pins, rivets, cotter pins, and other parts subject to rust are cadmium plated in this department, along with the chrome plating of certain parts which must be bright finished for appearance. An overhead monorail system extending the entire length of the department provides for transferring the work through the various stages required in the plating operations.

(Continued on Page 82)

Fig. 12—One Side of Assembly Department, Showing Workmen Assembling Atlas Bench Lathe



Where
precision
counts



WRIGHT AERONAUTICAL insures accuracy . . . with a SUPER-SERVICE RADIAL

For 7 years this Super-Service Radial has produced fast and accurate work in the plant of the WRIGHT AERONAUTICAL CORPORATION, Paterson, N. J. The job being handled is a rear accessory section of cast magnesium alloy for the 1000 H.P. WRIGHT Cyclone Engine.

Centralized control in the head — rapid power traverse — long spindle sleeve bearing at the bottom of the head — herringbone gears for the slow speed spindle drive — provide an ability to take heavy cuts without chatter and are just a few of the reasons why Super-Service Radials produce accurately and at low cost.

Write for catalogs giving complete information.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

What Do You Know About High Frequency Electric Tools

By G. H. DU SELL

Sales Engineer, Independent Pneumatic Tool Co., Chicago, Illinois

JUST as the manufacturers of automobiles, streamlined locomotives, aircraft and modern machinery were spurred by the necessity for saving time and increasing the efficiency of their products, so have the makers of portable tools been spurred to meet industry's demands for lighter, faster, more powerful tools.

Their answer to these demands is the modern High Frequency type electric tools which provide the features that portable tool users have been seeking. Requirements for portable tools are:

1. Maximum power with minimum weight.
2. Constant speed under load.
3. Operating ease.
4. Minimum power cost.
5. Minimum maintenance cost.
6. Minimum installation cost.

Because High Frequency tools meet

these requirements, the owner or manager of every shop using four or more portable tools should have a knowledge of the basic engineering, production and operating facts relating to them. This article presents, briefly, the major facts so that the user of portable tools can judge, in some measure, whether or not it will be to consider the installation of High Frequency tools in his shop.

Engineering Data

High Frequency tools are operated by 3-phase electric current, 220 or 180 cycles. This high frequency current is converted from the usual electric supply by a motor generator more commonly, by a frequency changer as shown in Fig. 1 and distributed to the tools.

The motor in High Frequency portable tools is the squirrel-cage, induction type in which type the speed

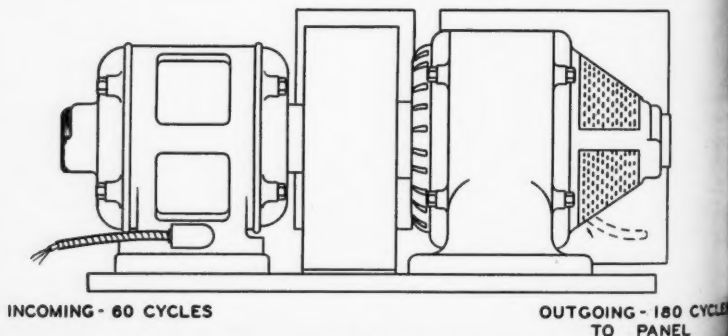


Fig. 1—Drawing illustrating relation of motor to frequency changer

your
tool

ner or
our or
e a kn
eering,
s relat
nts, but
the use
e, in a
it will
on of
p.

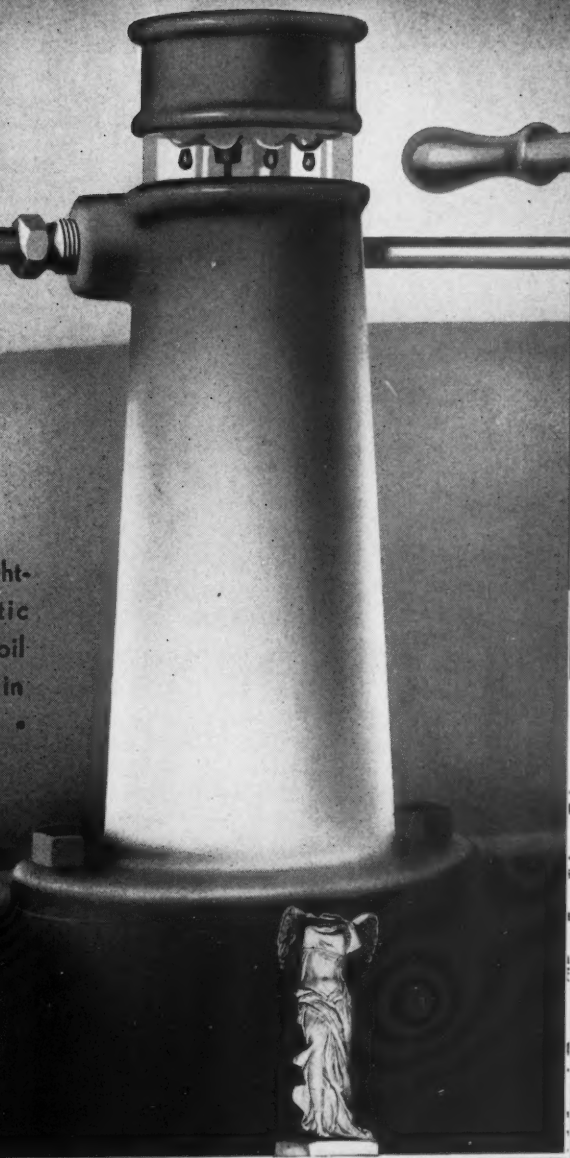
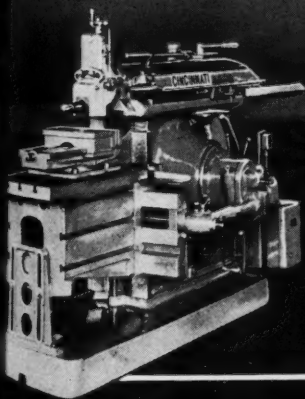
a
re open
t, 220
quency
usual
generator
frequ
1 and

quency
age, in
ne spe

CYCLES

r
mber,

Sealed... but visible as a light-
house... Sealed-in Automatic
lubrication means... clean oil
economy and long life in
Cincinnati Shaper.



THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS • SHEARS • BRAKES

the motor is governed by the frequency of the power supply—180 cycles. The High Frequency motor, wound for two poles, develops a rotor

Frequency tools is constant under load. The tool does not slow down when applied to the work. High Frequency tools deliver their rated

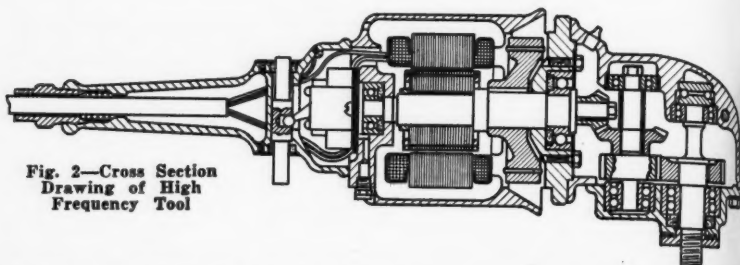


Fig. 2—Cross Section Drawing of High Frequency Tool

speed of 10,800 r.p.m. As shown in Fig. 2, the 180 cycle current enters the stator through the switch. There are no brushes, commutator or windings on the rotor.

Production Data

The characteristics of High Frequency induction motors provide the advantages that users of portable tools want.

1. Maximum Power. An induction motor of a given size develops three times as much power when driven by 180 cycle current as by 60 cycle current. (See Fig. 3.) In the 60 cycle, 2 pole, induction motor the speed is 3,600 r.p.m., while in High Frequency motors, operating at 180 cycles, the speed is 10,800 r.p.m. Since the speed is governed by the frequency of the current, the motor slows down only negligibly at maximum power. The power output of High Frequency tools is thus two or three times greater than that of Universal tools.

Moreover, this extra power is maintained throughout the life of High Frequency tools because there are no metal-to-metal sliding parts in the motor to wear and reduce the efficiency.

2. Constant Speed Under Load. The outstanding characteristic of High

power at 95 per cent of their full speed. (See Fig. 4.) This constant high speed of High Frequency tools permits the operator to give maximum production because he can do more work in less time. It also assures steady operation at the constant high speed recommended for twist drill, emery wheels, sanding discs, and

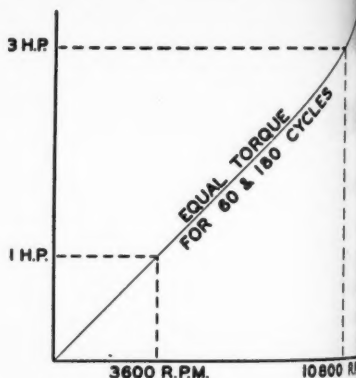
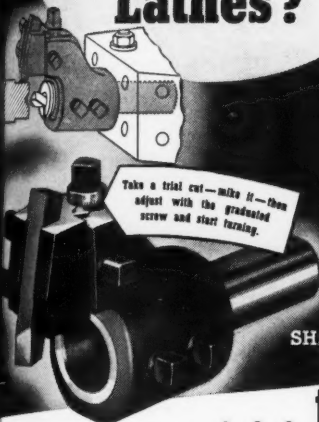
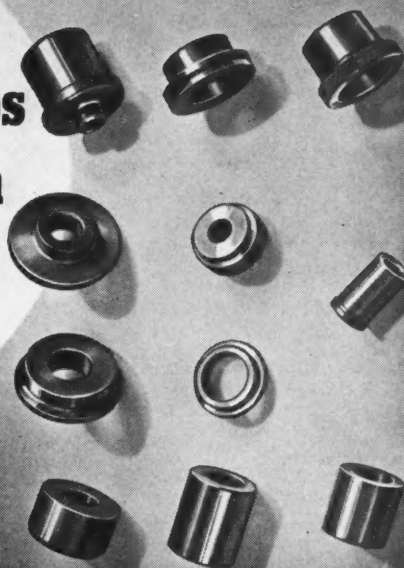


Fig. 3—Graph illustrating relation of speed input to power output.

on, prolonging their life and reducing replacement costs.

3. Light Weight. High Frequency tools weigh substantially less than Universal tools of comparable power. This means that they can be produced

Do You Do Jobs Like These On Your Turret Lathes?



Take a trial cut—make it—then
adjust with the graduated
screw and start turning.

SHANK SIZES—1", 1 1/4", 1 3/4"

... then you need this new Warner & Swasey ADJUSTABLE KNEE TOOL!

Because...

It is a brand new tool especially designed for short bar work—collars, studs, short studs, small gears, etc. It eliminates the need for special tool holders.

It saves set-up time! A millimeter screw instantly adjusts cutter—no rolls to set.

It saves working space! Notice how narrow this tool is—cross

This advertisement is one of a series introducing the new and improved Turret Lathe Tools developed by Warner & Swasey

slide cutters can be set close to the work without interference with turning, drilling, or boring operations.

4th—It takes heavy cuts! Body and shank are one piece. Adjustable head is heat-treated.

5th—It reduces tool inventory—3 tools in one—a turning tool, chamfering tool, a holder for drills, boring bars or reamers.

Ask the Warner & Swasey field service man—or write us—for a demonstration of this and other of the new Warner & Swasey Tools that step-up the productivity of any turret lathe.

**WARNER
&
SWASEY**

Turret Lathes

Cleveland



This new Tool Catalog and Manual, covering the most complete and modern line of turret lathe tools in the world, will be sent on request.

with higher spindle speed without objectionable weight, thus reducing fatigue and increasing operator efficiency. As compared with Air tools, the weight of High Frequency tools is about the same in the larger sizes; greater in the smaller sizes.

The result of these combined factors of more power, constant high speed and less weight is that High Frequency tools will increase the work done by portable tools in the average shop by more than 30 per cent.

Operating Data

4. Minimum Power Cost. The cost of operating a given number of High Frequency tools by power supplied through a motor generator or frequency changer is 25 per cent that of operating the same number of pneumatic tools with air supplied by a compressor of a size comparable to the High Frequency motor generator or frequency changer. The power cost

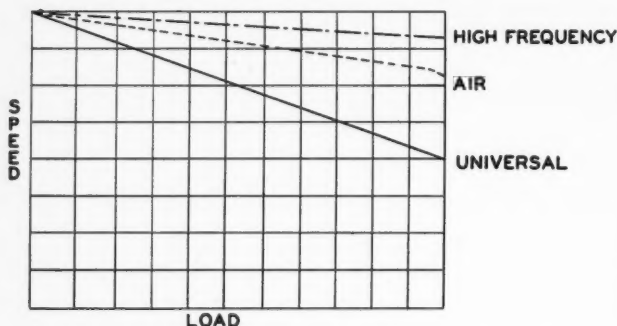


Fig. 4—Graph illustrating relation of power to speed

of operating High Frequency tools is the same as that of Universal tools.

5. Minimum Maintenance Cost. High Frequency tools have no sliding metal-to-metal parts in the motor; no pistons, toggles or reciprocating parts; no commutators, brushes, and so on. The simplified construction of

High Frequency tools assures maintenance costs.

One thing that contributes to this simplified construction is the sign of the High Frequency Rotor shown in Fig. 5. The rotor is made with solid copper bars, riveted

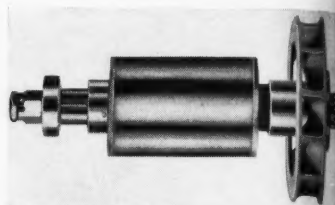


Fig. 5—Rotor used in High Frequency

welded into position. This construction is highly efficient electrically and is mechanically rigid. There are no revolving wires to become loose from the centrifugal action and cause short circuits. There are no commutators or brushes to wear. The rotor itself is balanced both statically and dynamically.

With regular inspection and lubrication, High Frequency tools can be maintained at high efficiency with low cost throughout the life of the tools.

6. Minimum Installation Cost. The first cost of a motor generator or frequency changer (Fig. 8) for the average installation of High Frequency tools is less than one-half that of the corresponding compressor plant, and the operating cost is in practically the same ratio. On large installations the cost is

assures

tes mo
n is the
ncy Re
cor is l
riveted

equency

const

rically

re are

oose fr

ause el

There

utators

wear

itself

oth sa

ynami

gular

d lubi

Frequ

be m

high

low

the

.

um Ins

ct of

chan

stall

ess

ding

perat

ne m

t is

er, 19

are Dumore en-
gineers licking a tough
job with a No. 12
"Chief" Grinder

DUMORE

HELPS LICK THE TOUGH JOBS

In the toolroom . . . the birthplace of time-saving, cost-cutting methods . . . and on countless exacting production jobs, Dumore grinders have been the means . . . and Dumore factory men have brought the methods . . . to crowd costs down and push production up. Whether you now own grinding equipment or not, it will pay you well to be familiar with the latest Dumore developments. A quarter-century of constant contact with manufacturing problems that daily become more complex . . . has equipped Dumore engineers to take tough grinding jobs in stride and lick them as a matter of routine. The experience and cooperation of these men are constantly at your command . . . without obligation. Write today for your copy of the 1938 Dumore catalog.

THE DUMORE CO. Dept. 188-1 Racine, Wisconsin



less. The cost of the High Frequency tools themselves is about the same as that of modern air tools.

Compared to Universal tools, the



Fig. 6—Thor No. A46P High Frequency Right Angle Polisher. Speed, 1800 r.p.m. Weight, 15 lbs. Length overall, 17½ in. Length of Right Angle Head, 5½ in.

installation of a frequency changer for High Frequency tools is, of course, an additional investment and the power cost of High Frequency tools is the same as that of Universal tools. However, the increased investment is offset by the greater amount of work accomplished by the High Frequency tools and the substantial savings from fewer replacements and lower maintenance cost. In small shops operating as few as four tools it has been found that, on the average, 100 per cent is returned on the investment in a single year.

This condition may or may not obtain in any given shop, but the opportunities for increased production and reduced operating costs from the

installation of High Frequency tools can readily be determined by an analysis of the existing equipment.

Every kind and capacity of portable tools is available in High Frequency; including drills, screw drivers, setters, grinders, sanders, rubbers, polishers, taps and stud-setters.

Every production shop should obtain all of the information regarding high frequency equipment so that he can determine for himself



Fig. 7—Thor No. AKVL High Frequency Setter with No. 206 Right Angle Attachment. Capacity, ½-in. nut. Free speed, 340 r.p.m. Weight, 12½ lbs. Length overall, 14½ in. Length of right angle, 5 in.

whether or not it will pay to install high frequency equipment.

(Photos and drawings courtesy Independent Pneumatic Tool Co.)

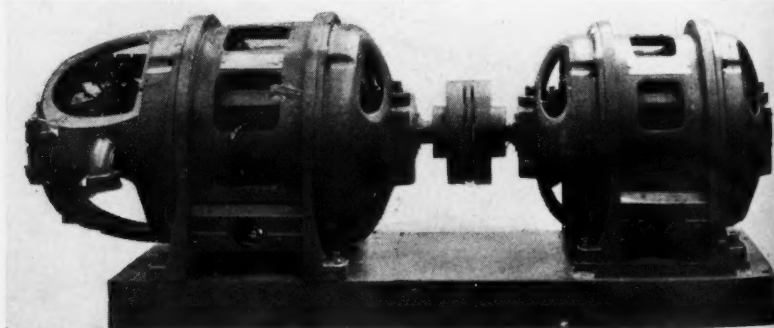


Fig. 8—Westinghouse Induction Frequency Changer Motor-Generator Set

uency
by an
ment.
ty of
available
; inch
drivers,
s, and
rs, tap

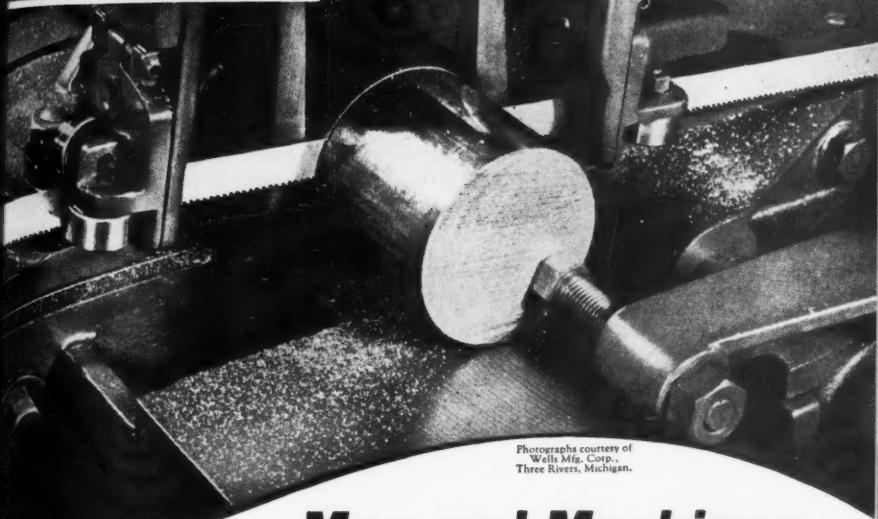
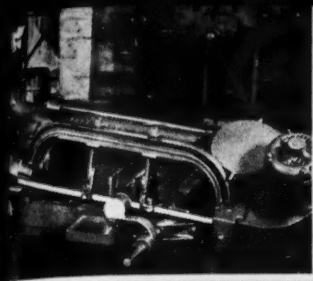
uction
of the
equip
for him

equency
Attache
340
11, 14
in.

to inch

courtesy
Tel

er, 15



Photographs courtesy of
Wells Mfg. Corp.,
Three Rivers, Michigan.

Men and Machines... more productive with **FLEXIBLE-BACK DISSTON BANDS**

Costs are cut, earnings increased, when you cut with Disston Bands. They stay sharp, cut accurately on the widest range of materials, sizes and shapes ever cut on band-saw machines.

Every tooth is hardened alike; edge hardened to base of teeth. Teeth milled . . . scientifically and accurately set.

You need Disston Hard-Edge, Flexible-Back Bands. Unrivalled in taking the bend over a wheel. Unequalled in resisting the strain of quarter turning.

No Substitute for Disston Steel

In metal-cutting saws! Gives modern results you must have in cutting new alloys, new hard materials, under new and harder conditions. Tough, flexible, durable. Developed in Disston Steel Works.

For complete data, write Henry Disston & Sons, Inc., 921 Tacony, Philadelphia, U. S. A. Branches: Boston, Chicago, Detroit, Memphis, New Orleans, Seattle, Portland, Ore., San Francisco, Vancouver, B. C. Canadian Factory: Toronto.

Three different styles of set in Disston
Hard-Edge Metal Band Saws 6, 8, 10,
12, 14, 16 and 22 teeth to inch.



Disston Metal Band Saws are made
with blades hardened throughout;
run at high peripheral speed; fur-
nished with any tooth spacing desired
from 6 to 24 teeth to inch. Flexible-
Back Bands only. Hard-Edge, Flexible-
Back Bands. Teeth are not
milled—they are milled, and then
accurately set by machine.



DISSTON METAL-CUTTING BAND SAWS

Method of Constructing Time Study Standard Data at East Pittsburgh Plant

Second Section of this Article—Comparing Computed Formula Values with Actual Corresponding Performance Values.

UPON the completion of the formula curves, tables, and algebraic expressions, it is always advisable that the constructor make a series of tests for the purpose of proving to himself and to the immediately interested supervisors and operators that the computed formula values really reflect the actual standardized operating conditions.

These preliminary tests usually consist in either comparing computed formula time allowances with already existing time values that were established from satisfactory individual time studies made under identical standardized operating conditions, or by comparing calculated time values with values derived from corresponding selected time studies of identical jobs that were used in constructing the formula.

Calculated formula time values may also be compared with values derived from overall time studies made on corresponding jobs, but this is less satisfactory than the two other methods because it requires more of the constructor's time.

Formula Report:

Upon the satisfactory completion of these preliminary comparative tests, the constructor proceeds to compile the formula report. This report consists of a detail description of the operating conditions, equipment, and tools, and of the manner in which the standardized operation cycle is to

be performed so that any other time study man may readily understand the constructor's intentions, apply the formula correctly, and if necessary be able to defend the reasonableness of the computed time values in case their adequacy should ever be challenged.

The descriptive data of such a formula report also permits a revision of the formula in case changes in the operating or processing conditions occur in the course of time.

To insure a uniform logical development of this descriptive data so as to include all the available pertinent information, a standard outline of report procedure has been developed which includes the following: Formula No., Date, Name of Part, Operation, Work Station, Allowed Time, and Application. This information is compiled on a form known as a "Work Sheet." Following is a Work Sheet for the operation of Rough Turning Steel Shafts:

Part: Shafts from 3 in. to 7½ in. Stock Dia.

Operation: Rough Turn

Machine: 30-in. Lathe

Allowed Time:

SET UP (Hrs.) =
.1498 + Table No. 1 + .1227R

EACH PIECE (Hrs.) =
.2250 + .0042F + Curve No. 1
+ Chart No. 1 + (Table No. 2
B' + .0510R'

Timely Formulas and Tables of Essential of Westinghouse Electric and Mfg. Co.

BY G. A. BAESLACK
Manufacturing Engineer

Where:

- F = Number of cuts required.
B = Number of undercuts.
R = To be used only when steady rest is required. Generally on shafts over 70 in. long.

Table No. 1

To study drawing
& list dimensions.

Number of Fits	Allowed Hours
3	.0328
4	.0538
5	.0748
6	.0958
7	.1168
8	.1378
9	.1588
10	.1798
11	.2008
12	.2218
13	.2428
14	.2638
15	.2848
16	.3058
17	.3269
18	.3478
19	.3688
20	.3898
21	.4108
22	.4318

Table No. 2

Undercut Bearing
Fit operations Y,
Z & A-1.

Rough Bar Diameter	Allowed Hours
3	.0735
3 1/4	.0767
3 1/2	.0799
3 3/4	.0831
4	.0863
4 1/4	.0894
4 1/2	.0926
4 3/4	.0958
5	.0990
5 1/4	.1020
5 1/2	.1052
5 3/4	.1084
6	.1116
6 1/4	.1148
6 1/2	.1180
6 3/4	.1212
7	.1244
7 1/4	.1276
7 1/2	.1308

driving chucks, ball bearing tail stock and variable speed motor drives with control handle at carriage.

Centered bar stock ready to be turned is stored in racks located along the aisle in front of each machine. Bars weighing less than 1,000 pounds are lifted to and from the lathe with an electrically-operated jib hoist; bars weighing 1,000 pounds and over are too difficult for the average operator to handle with a jib hoist; such bars are therefore lifted by the overhead traveling crane, and the time allowance is adjusted accordingly, (see curve No. 1).

Job order cards are delivered to the operator by the production clerk.

Tungsten carbide tools are removed from the machine and sent to the tool crib to be ground twice daily, for which 4 per cent is included in all time allowances.

For oiling and cleaning of the lathe, 4 per cent is added to all time values.

Marking off the lengths to be turned on a bar was found to vary with the nature of the cuts, rather than the number of cuts or fits, so the average of 7 markings and 3 rule and crayon handlings were allowed on all jobs.

Procedure:

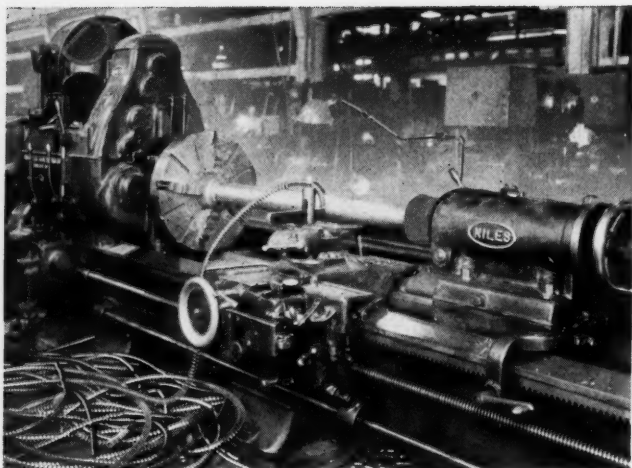
Set Up: Get job and drawing, study drawing and make out dimension sheet, loosen tail stock, place tail stock in position, tighten tail stock.

Application:

Steel shafts to 7 1/2 in. rough stock diameter rough turned with carbide tools, with conditions as of November 1, 1937.

Analysis:

Tools required are: Six foot rule, scale, calipers, wrenches, carbide turning and undercutting tools, and a set of numeral stamps for numbering each shift. Lathes are equipped with



Shaft-Turning Job
Type Referred to
Accompanying An-
swers and Formulas

When necessary; get, arrange, and remove steady rest.

Each Piece: Get hoist and move to material, locate part, arrange bar to lift, attach rope sling, hook on and lift, move to machine, place part in machine, run in and tighten center, tighten driving chuck, start machine, pick up rule and crayon, mark off length, lay rule and crayon aside, set tool to depth, lock feed, turn, run carriage back, stop machine, loosen driving fixture, loosen and run out center, remove shaft from machine, turn shaft end for end and repeat operations as above, get stencils and hammer, stamp order number on shaft, lay aside stencils and hammer, release

When necessary, set back-tool bar undercut, undercut and run back-to-clear, adjust steady rest jaws and tighten, release steady rest jaws, loosen steady rest and push clear.

Time Studies:

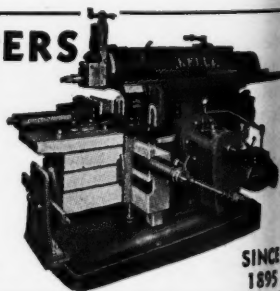
S- 1	10- 6-37	J.D.
S- 2	10- 6-37	J.D.
S- 3	9-28-37	J.D.
S- 4	9-22-37	W.D.W.
S- 5	10-14-37	J.D.
S- 6	9-24-37	J.D.
S- 7	10- 5-37	J.D.
S- 8	10- 4-37	J.D.
S- 9	9-23-37	J.D.
S-10	9-28-37	J.D.
S-11	11-18-37	W.D.W.



CRANK SHAPERS HEAVY DUTY

Made in six sizes from 16" to 36" stroke, with motor or single pulley drive. Timken Bearings throughout. Revolving Table. Semi-automatic pressure lubrication. Centralized control. Stroke and feed adjustment during operation. Thoroughly guarded to protect operator and machine. One year guarantee.

GENERAL ENGINEERING & MFG. CO.
ST. LOUIS MISSOURI



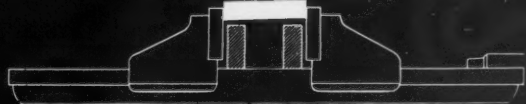
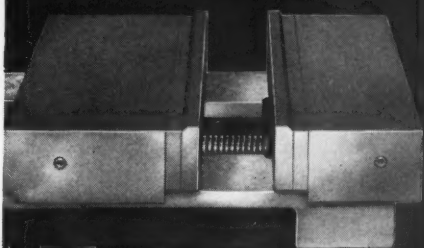
SINCE
1895

Investigate THE NEW DOWN-GRIP *machine* VISE

MAKERS AND USERS OF MACHINE TOOLS—

... will recognize in the new "DOWN GRIP" VISE an important contribution to machine tool efficiency. Simultaneously with an equal side pressure, the jaws exert a downward pull which automatically levels the work without resort to tamping or resetting. No slipping—no distortion. Combines extreme accuracy with greater speeds — cuts production costs.

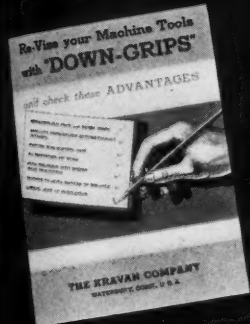
Re-vise your machine tools with "DOWN GRIPS". Data of great interest to you supplied on request.



The OLD Way



The "DOWN-GRIP" Way



SEND FOR BULLETIN **The KRAVAN Co.** WATERBURY CONN.

Table of Details:

Symbol	Operation Description	Allowed Hours	Reference Formula No. 1 Power Dept.
W	Get job, drawing and turn in time	.1000	
B	Study drawing & make out sheet	Table No. 1	All studies
C	Get hoist and move to material	.0064	S-9
D	Locate part	.0183	Average
E	Attach rope sling to part	.0040	S-2-8
F	Hook on and lift	.0036	S-4
G	Move part to or from machine	Curve No. 1	All studies
H	Loosen tail stock—4 nuts	.0136	Average
I	Place part in machine	Curve No. 1	All studies
K	Move tail stock in position	.0059	Average
L	Tighten tail stock—4 nuts	.0192	S-1-2
M	Run in and tighten center	.0040	S-1-7
N	Release hoist and put rope aside	.0033	S-2-7
P	Tighten driving fixture—2 screws	.0117	S-11
Q	Start machine	.0013	S-1 to 6-11
R	Pick up 6 foot rule and crayon	.0027	S-1-2
S	Mark off lengths (Per length)	.0043	S-1-2
T	Lay aside rule and crayon	.0022	S-1-2
U	Set tool to depth of cut	.0028	S-1-4
V	Lock feed	.0011	S-2-6-7-8
W	Rough turn	Chart No. 1	
Y	Run carriage back per inch	.00028	S-10
Y	Set back-tool for undercut	.0141	S-11
Z	Undercut bearing fit	Table No. 2	S-1-3-4-5-11
A	Run back-tool clear	.0140	S-5
B	Stop machine	.0013	S 1 to 6-11
C	Loosen driving fixture — 2 screws	.0105	S-6
D	Run center out	.0034	Average
E	Remove shaft from machine	Curve No. 1	All studies
F	Turn shaft end for end	"	" "
G	Get stencils and hammer	.0050	S-7
H	Stamp order number on shaft	.0152	Average
J	Lay aside stencils and hammer	.0037	S-9
K	Lower shaft and unhook hoist	Curve No. 1	All studies
L	Arrange bar to lift	.0212	S-8
M	Change speed		While cutting
N	Get, arrange steady rest and clamp to lathe	.0702	S-4
P	Adjust steady rest jaws and tighten	.0046	S-4
Q	Release steady rest jaws	.0158	S-4
R	Loosen steady rest and push clear	.0268	S-4
S	Loosen 4 nuts and remove tool from post	.0188	Average
T	Procure tool from cupboard	.0150	"
U	Place and tighten tool in post — 4 nuts	.0703	"
V	Make trial cut and set adjusting dial	.0345	S-11
Z	Wait for crane service, (bars 1000 lb. or over)	.1660	Power Gen. No.
A	Crane lift, job to machine	.0250	" " "
B	Place part in machine	.0345	" " "

Synthesis:

Set Up = (W' + H + K + L) =
 (.1000 + .0136 + .0059 + .0192)
 1.08 = .1498 Hr. Constant for,
 get job, drawing, turn in time,
 and adjust tail stock.
 (2N₁ - R₁) 1.08 = (.1404 -
 .0268) 1.08 = .1227 Hr. Constant
 for get, arrange, and remove
 steady rest.

Each Piece = (C + D + 3E +
 3F + 2M + 2N + 2P + 2Q +

$$\begin{aligned}
 &3R + 7S + 3T + 2B_1 + 2C_1 + \\
 &2D_1 + G_1 + H_1 + J_1 + L_1) 1.08 \\
 &= (.0064 + .0183 + .0120 + \\
 &.0108 + .0080 + .0066 + .0224 \\
 &+ .0026 + .0081 + .0301 + .0068 \\
 &+ .0026 + .0210 + .0068 + .0000 \\
 &+ .0152 + .0037 + .0212) 1.08 = \\
 &.2250 \text{ Hr.}
 \end{aligned}$$

(U + V) 1.08 = (.0028 + .0011)
 1.08 = .0042 Hr. constant for, set
 turning tool to depth and lock car-
 riage feed.

BUY BARBER-COLMAN GROUND HOBS

for Economy

Shipped in Large Lots

Average daily shipments of Barber-Colman Ground Hobs are large. No boast, this fact indicates that many manufacturers prefer Barber-Colman Ground Hobs. Additional evidence of preference is the fact that original orders are followed by "repeats" almost without exception. Why? Because Barber-Colman Ground Hobs are backed by experience, proved by performance; accurate, durable, economical. Investigate.



PRODUCTS

MILLING CUTTERS,
HOBI, HOBBING
MACHINES, HOB
SHARPENING MA-
CHINES, REAMER,
REAMER SHARP-
ENING MACHINES,
SPECIAL TOOL

BARBER - COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

$(P_1 + Q_1 + R_1) 1.08 = (.0046 + .0158 + .0268) 1.08 = .0510$ Hr., constant for handling steady rest, after it has been set on lathe.

Table No. 1 was derived from a curve which showed the time for operation "B" to vary directly with the number of fits to be turned.

Table No. 2 was derived from a curve which showed the time for operation "Z" to vary directly with the rough bar diameter. The table No. 2 values include the time values for operations "Y" and "A₁" which were added to the auxiliary curve values.

Curve No. 1 (Fig. 4, page 68, August issue of Modern Machine Shop) was derived by first plotting individual curves for elemental operations G, J, E₁, F₁ and K₁ to determine the relation of rough bar weight to handling time for each. The corresponding time values from the five curves were then added, those of the elements G, J, and E₁ taken twice. Since they occur twice per shaft, and each sum was multiplied by 1.08 (tool grinding and machine oiling and cleaning allowance), these latter products were then used for constructing curve No. 1, which therefore consists of elemental values $(2G + 2J + 2E_1 + F_1 + K_1) 1.08$ for all rough bar weights less than 1000 lbs.

For bars weighing more than 1000 lbs. the handling time = $[(2Z_1 + A_2 + 2B_2) - (3E + 3F + 2N)] 1.08 = [(.3212 + .0250 + .0690) - (.0120 + .0180 + .0066)] 1.08 = .428$ Hr. per bar, as shown on curve No. 1.

Chart No. 1 is based on the following formula:

$$\frac{1''}{\text{R.P.M.} \times \text{Feed (Rev. per inch)}} \times .0167 \text{ Hr.} \times 1.10 \times 1.08 + .0003.$$

Where .0003 = Operation Y₁ + 8%.

The 8 per cent additional allowance consists of the customary 4 per cent

allowance for oiling and cleaning the type of machine, and 4 per cent for changing the carbide tools twice daily at the tool crib. This latter percentage was developed as follows:

$$\frac{2 (S_1 + T_1 + U_1 + V_1) 1.04}{2 (.0188 + .0150 + .0703 + .0346)} = \frac{1.04}{.292} \text{ Hr. per day.}$$

$$\frac{.292}{8.00 - .292} = 3.8\%: \text{ call it } 4\%.$$

The 10 per cent allowed in the cutting time values of chart No. 1 is the customary fatigue and possible delay allowance on cutting time. To all the handling time values the usual 15 per cent fatigue and delay allowance was added when the individual time study summary values were developed.

Inspection:

All the shaft diameters are rough turned 1/32 in. over the specified finish sizes to allow for the grinding operations.

Wage Payment:

Work will be done under the Individual Standard Time Wage Payment Plan.

- Analysis.
- Procedure.
- Time Studies.
- Table of Detail Operations.
- Synthesis.
- Inspection.
- Wage Payment.

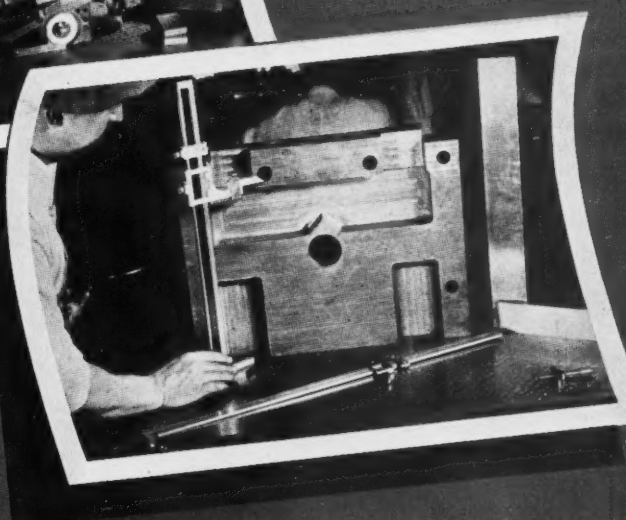
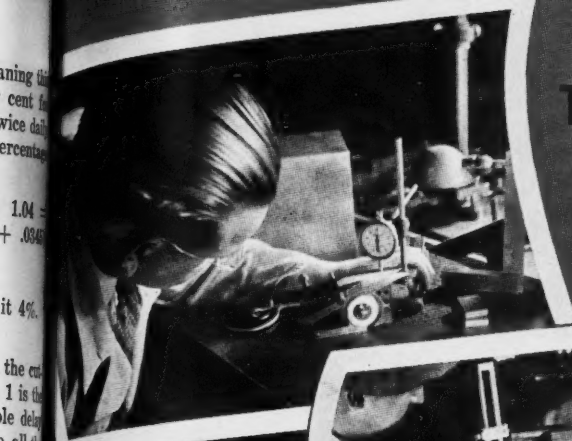
Signatures of Constructor and Approver.

The following complete practical formula report illustrates how this detail information and the algebraic expressions are developed.

Formula Work Sheets:

To facilitate the daily routine application of the formula it has been found convenient to compile "Work Sheets" from the formula report. These work sheets contain only the

From the
TOOLROOM



to the
**SPECTION
BENCH**

TARRETT S *set the standard*

There's one simple way to raise the standard of accuracy in your shop — to see that every job is laid out, produced and inspected with Starrett Dial Indicators. With safe, dependable Starrett precision guards the accuracy of every operation, there's no need for doubt or uncertainty. The closest tolerances leave plenty of room for speed and confidence. See you the new Starrett Catalog No. 26MD. It describes and illustrates new additions to the complete Starrett line. Write for a copy.

Top Photo: Checking an angle parallel with a Starrett Dial Test Indicator, Universal Protractor, Toolmaker's Clamp, Steel Square and Micrometer.

Bottom Photo: Inspecting a die with Starrett Vernier Height Gage, Vernier Caliper, Micrometer Depth Gage and Steel Square.

THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.

World's Greatest Toolmakers — Manufacturers of Hacksaes Unexcelled — Steel Tapes Standard for Accuracy — Dial Indicators for Every Requirement

Standardize on
STARRETT TOOLS
BUY THROUGH YOUR DISTRIBUTOR

essential information necessary for the correct application of the formula, namely the brief information given in the report under the sub-headings; Part; Operation; Machine; Allowed Time, which includes Charts, Tables and Curves; Application; Inspection, and Payment.

Since work sheets are less bulky than the formula report they also facilitate the filing of this essential working data in convenient folders; one clamp cover folder can therefore accommodate quite a number of sets of work sheets from the various formulas that must be constantly applied in processing departments. The complete formula report, time studies and Master Table of Detail Time Studies, etc., of each formula can be kept in a suitable envelope, properly labelled and filed to be available when detail information is needed.

Both the original formula report, with its curves and chart sheets, and the work sheets should be typed and plotted on a durable, thin grade of special paper from which clear blueprints can be made; the latter are then applied to daily use while the original copies are kept neat and clean in a file where they will be available for duplication.

The "Work Sheet" shown on page 38 of this issue, which is a part of the "Rough Turn Shaft" formula, and the illustrative example given below show how this formula data is applied in computing, directly from the dimensions on the drawing, the time allowances for the rough turning of a representative type of steel axle shaft.

WORK SHEET

Note:

(F') To determine the depth of cut, take the diameter from which the cut is made, then subtract the diameter to which it is turned and divide the remainder by (2) two.

Example:

$$\begin{array}{l} 6 \text{ in. diameter turned to } 5 \text{ in. diam.} \\ 6 - 5 \\ \text{eter} = \frac{\quad}{2} = \frac{1}{2} \text{ in. cut. } \end{array}$$

undercut bearing where the depth of cut is $\frac{1}{2}$ in. or over required (2) cuts.

Add $\frac{1}{16}$ in. to the depth of cut in all cases where the cut is taken from the rough stock diameter. (The reason for this is that the rough stock is not a perfect circle and centers may be slightly off the center lines.) Also add $\frac{1}{8}$ in. to length of each cut.

When making calculations from the machining chart, use the diameter from which the cut is taken. (In no case use the diameter to which it is machined.)

(B') Undercutting is necessary on bearing fits, and when the largest diameter to be turned extends less than 16 in. from either end.

(R') When one of the fits is undercut enough to weaken the shaft it will be necessary to use a steady rest, although the shaft may be less than 70 in. long. When there are two or more of such undercut fits, the R' in the each piece expression becomes 2R'.

Application:

All steel shafts to $7\frac{1}{2}$ in. rough stock diameter rough turned with carbide tools, with conditions as of November 1, 1937.

Inspection:

Shafts are turned $\frac{1}{32}$ in. oversize to allow for grinding.

Wage Payment:

Standard Time.

J. Doe.

Chart No. 1

Chart for turning steel shafts on the 30-in. Engine Lathe with Tungsten Carbide tools with 0.018 in. Feed. Includes 0.0003 hours per inch to run carriage.



RED TANG

COLOR ON THE TANG TRADE-MARK REG. U. S. PAT. OFF.

a Guide to File Quality

Teeth like a metal saw make
these new, high-grade files cut
better and last longer.

SIMONDS

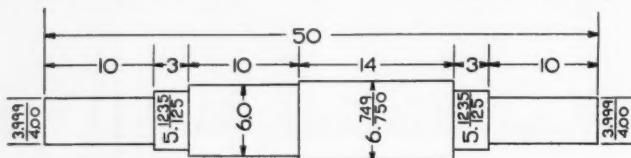
SAW AND STEEL COMPANY
Fitchburg Massachusetts

Untreated Axle Steel				Treated and Nickel Steel			
Dia.	R.P.M.	Ft. Per Minute	Hours Per Inch	Dia.	R.P.M.	Ft. Per Minute	Hours Per Inch
3 1/4	238	203	.0049	3 1/4	234	200	
3 1/2	238	210	.0049	3 1/2	218	200	
3 3/4	238	232	.0049	3 3/4	205	200	
4	228	249	.0049	4	191	200	
4 1/4	224	250	.0052	4 1/4	180	200	
4 1/2	212	250	.0055	4 1/2	170	200	
4 3/4	201	250	.0058	4 3/4	161	200	
5	191	250	.0061	5	153	200	
5 1/4	181	250	.0064	5 1/4	145	200	
5 1/2	173	250	.0067	5 1/2	139	200	
5 3/4	166	250	.0069	5 3/4	133	200	
6	159	250	.0072	6	127	200	
6 1/4	152	250	.0075	6 1/4	122	200	
6 1/2	146	250	.0078	6 1/2	117	200	
6 3/4	141	250	.0081	6 3/4	113	200	
7	136	250	.0084	7	109	200	
7 1/4	131	250	.0087	7 1/4	105	200	
7 1/2	127	250	.0089	7 1/2	102	200	

Note: Use 238 r.p.m. for diameters less than 3 3/4 in.

Do not use any speed greater than 238 r.p.m., to avoid galling spindle bearings.

Use the diameter from which the



Axle, 50-In. x 7 1/4-In. Axle Steel. Rough weight, 578 lbs.

cut is taken when reading the table.

Do not figure over 1/2 in. depth of cut for diameters over three inches.

For diameters less than three inches use 1/4 in. maximum depth of cut.

The dimensions of the rough turned

1st cut, reduce 7 1/4	dia. to approx. 6 1/8	dia. is 13 lg. allow 13 1/8 x .0087 = 1.140
2nd cut, reduce 6 1/8	dia. to approx. 5 5/32	dia. is 13 lg. allow 13 1/8 x .0075 = .985
3rd cut, reduce 5 5/32	dia. to approx. 4 25/32	dia. is 14 lg. allow 14 1/2 x .0087 = 1.230
4th cut, reduce 4 25/32	dia. to approx. 4 1/32	dia. is 10 lg. allow 10 1/2 x .0064 = .640
5th cut, reduce 4 1/32	dia. to approx. 3 5/8	dia. is 23 lg. allow 23 1/2 x .0087 = .200
6th cut, reduce 3 5/8	dia. to approx. 5 5/32	dia. is 13 lg. allow 13 1/8 x .0078 = .100
7th cut, reduce 5 5/32	dia. to approx. 6 1/32	dia. is 10 lg. allow 10 1/2 x .0078 = .078
8th cut, reduce 6 1/32	dia. to approx. 4 1/32	dia. is 10 lg. allow 10 1/2 x .0064 = .064

Total Cutting Time Allowance = .846 Hr.
Number of cuts required (F) = 8

The time allowed per shaft rough turned therefore equals:

Handling Time Constant	—	.2250 Hr.
.0042 x F ²	=	.0042 x 8 = .0336 Hr.
Curve No. 1 for Handling Shaft	—	.0650 Hr.
Chart No. 1	—	.8465 Hr.

Total time allowed per shaft machined — 1.1701 Hr.; call it 1.17 Hr.

Grinding Rubber Printing Press Rollers

In this article the author tells how a used lathe was converted into a machine for grinding rubber rollers, and thus presents progressive job shop operators with an idea.

By L. H. HOUCK

DUE to certain advantages which are inherent in the composition of rubber, the use of rubber rollers on newspaper presses throughout the country is constantly increasing. Periodically, however, these rubber inking rollers must be refinished, due, not to wear on the surface, but to the fact that a rubber roller swells slowly with use and ultimately may swell to a size that makes it impossible to adjust the roller on the press. A 6-in. roller may, in some cases, swell from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. in from six months to a year.

Ordinarily a 6-in. roller can be ground as many as ten times—perhaps more—but each time it is returned to service it becomes more oil-soaked and porous and is harder to regrind the next time. The softer a roller becomes, the harder it is to grind and polish it and the longer it takes. Form rollers, particularly, must be finished with care because they distribute the ink on the plates or type-forms, and any pattern left on the roller in the finishing operation will be transferred to any solids on the printed page.

There are many newspaper publishers using rubber rollers, but only the very large newspaper plants have their own maintenance departments, consequently they are forced to send their rubber rollers out to jobbing

shops for refinishing. Whether job is done in the newspaper plant in a jobbing machine shop is immaterial; the process is the same.

The publishers of the Tampa Times decided to install their own equipment for this task, and accordingly set about finding a lathe which would take their larger roller—which was 112 in. long. The shortest roller in use in this plant is 84 in. long, but the rollers have the same amount of rubber, which is 70 in. The lathe finally selected was a South Bend with a 16-in. swing and a 10-ft. bed. The 10-ft. bed was actually too short to take the 112-in. roller, but with certain alterations which will be explained in this article it was made to serve.

Since the amount of rubber to be ground was the same on all rollers it was evident that if the 21-in. diameter of the 112-in. roller could be slipped into the spindle of the lathe, all rollers could be accommodated. Rubber rollers are ground in bearings instead of between centers anyway, due to the fact that printing rollers fit into the presses more accurately if they are ground in bearings.

The hole in the spindle of the lathe was $1\frac{1}{8}$ in. and the shafts of the rollers were $1\frac{1}{2}$ -in. diameter. After making sure that there was sufficient stock in the spindle, the spindle was

bored to 1½ in. for a distance of 12 in. It was figured that very little of the original strength of the spindle was lost, or at least that ample strength was retained for the job in hand.

With such small clearance it was desirable that the hole in the spindle be bored as accurately as possible and also it was remembered that the nose would have to be reamed out again for a center, because when it was bored out most of the taper for the center was lost.

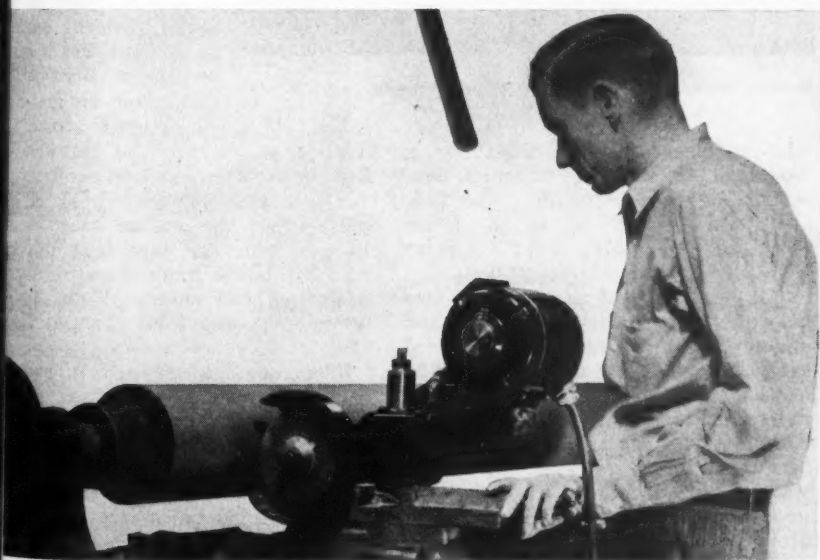
A 1½-in. boring bar about 3 ft. long was used with a Morse taper on one end that could be fitted in the tailstock. The taper in the nose of the lathe was a bastard for a sleeve somewhere between a No. 4 and a No. 5 Morse, and was about 5 in. deep. At the end of this taper the hole in the lathe began at 1½ in. and continued all the way through.

The boring bar was turned down

6 in. on the end to 1½ in., the size of the hole in the spindle, and the cutting tool was reset at near the end of the turned portion. This turned part formed a pilot for the bar and settled into place beyond the taper in the nose of the spindle.

With the other end of the bar in the tailstock, the cutter was positioned and the cutting started with the lathe turning at its slowest speed. It was necessary to make the bore at one cut if possible, as the cut destroyed the pilot hole and it would have been necessary to make a new pilot for a second cut, in which case it would have had a rough hole to follow. By running slow and using a light feed, the hole was bored without event except for the use of an unusual amount of cutting oil.

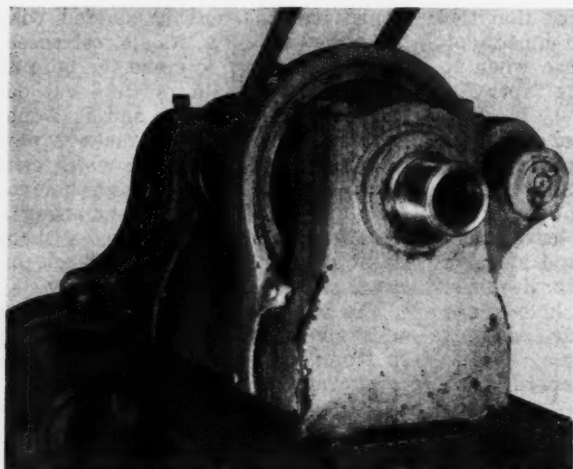
The bar was fed by hand with the tailstock screw. The carriage was set in front of a rod clamped to the bar to prevent the tool from grabbing.



Grinding rubber roller for printing press, using a Dumore No. 7 grinder with 5-in. No. 4043 wheel. An extra smooth finish is required on this type of roller. Diameter of this roller was reduced nearly 3/4 in. and finished with wheel shown. Note smoothness of roller.

After the hole was bored, the nose was reamed out with a No. 5 Morse taper reamer. The reaming was done as slowly and carefully as possible, with the lathe turning very slowly and using the tailstock to feed and maintain alignment. After being reamed and cleaned out, a No. 5

shape of a tailstock but somewhat heavier. These were made and cast side and the bottom milled off casting and the bottom V'd to fit the ways of the lathe. In the place of the bearings, 2½-in. holes were bored to receive the bronze bushing for the bearings.



Hole in lathe spindle after boring and reaming with Morse No. 5 taper reamer.

adapter sleeve was installed for a No. 4 center. With the tailstock center in the proper position, the tailstock was brought up to the headstock and they met point to point without further adjustment.

The next thing was to devise two bearings, one for the headstock and one for the tailstock. It was decided early that these bearings should be non-adjustable. Once they were accurately bored, set-up time would be eliminated on the roller grinding job because once the roller to be ground was in the bearings, there would be no adjustments to make; all the operator had to do was to set his grinder and grind rollers.

For these bearings it was decided to have two castings made in the

The bushings were bored to fit the roller shafts by setting up a boring bar in the headstock and tailstock. The bar extended through the rough hole in the bushing and the cutter was set so that when the hole was finished, the 1½-in. reamer would easily started. A standard reamer 0.005 in. oversize was used, and it provided a perfect fit for the roller shafts. Both bearings were bored in place on the lathe, which ensured alignment. Yet it was a matter of some jubilation when the first roller ground struck the

four plates across the big \$100,000 Duplex press evenly and surely.

Some idea of the speed of the plates and the rollers may be obtained from the fact that this machine using more than 200 horsepower at full speed, prints 24-page newspapers and folds them at 72,000 an hour.

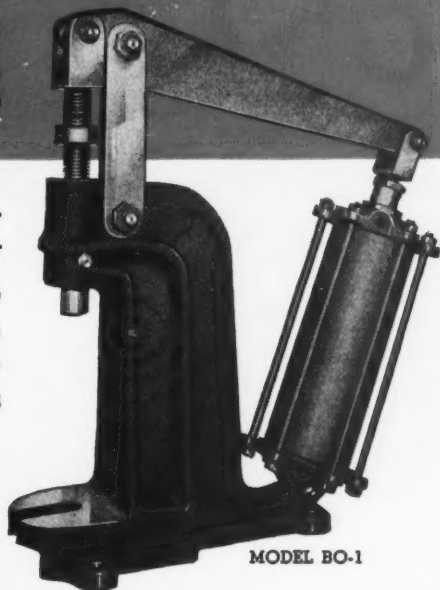
The bushings are held in place by each casting by headless screws threaded in at the top on each side. An oil hole was drilled between them. Closed oil cups will be installed later because the holes fill with soapstone and rubber particles.

There is an advantage to using bushings of this type in one-piece non-adjustable settings, and that is that in grinding rollers with different

HANNIFIN

AIR OPERATED ARBOR PRESSES

For assembling, broaching, piercing, keyway cutting, oil grooving, straightening, pressing, molding, and many similar production operations



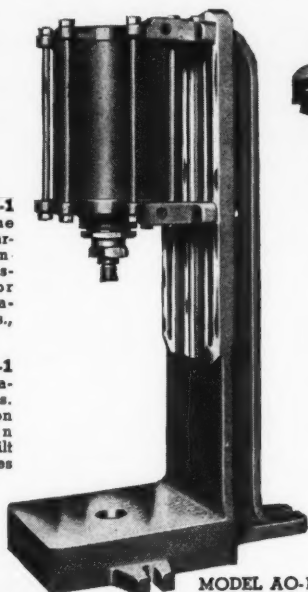
MODEL BO-1

These Hannifin presses are equipped with the Hannifin improved air cylinder, having outside adjustment of the piston packing. High efficiency operation is easily maintained throughout the entire life of the piston packing.

Cylinder bores are ground and honed. Perfect piston fit in a mirror-finish bore means maximum power and elimination of leakage troubles.

Hannifin Arbor Presses are available in a full range of types and sizes, capacities 600 lbs. to 50,000 lbs. They can be furnished with the Hannifin patented oil cylinder speed control where a steady, controlled ram stroke is required. Write for recommendations.

Write for Bulletin 36-MM.

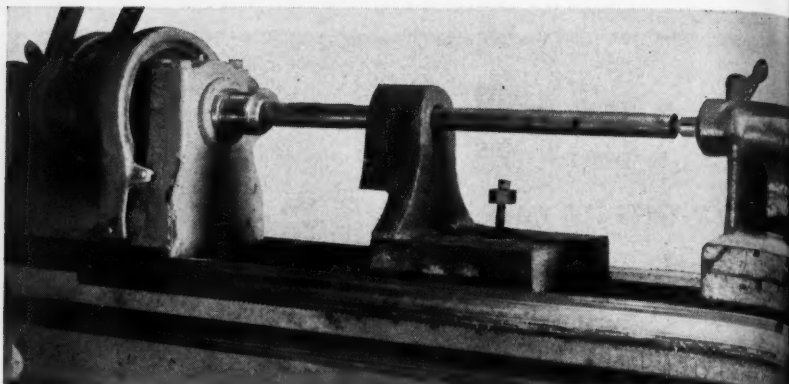


MODEL AO-1

MODEL BO-1
semi-steel frame
ratio arm type arbor
press. A compact,
high pressure press for
small work. Capacity
10,980 lbs., stroke
1 inch.

MODEL AO-1
arbor press. Capacity
2,650 lbs. Cylinder position
adjustable in frame. Also built
in other capacities

HANNIFIN MANUFACTURING COMPANY • 621-631 SOUTH KOLMAR AVENUE • CHICAGO, ILLINOIS
ENGINEERS • DESIGNERS • MANUFACTURERS • Pneumatic and Hydraulic Production Tool Equipment



Boring a bearing for use in grinding rubber roller. The $2\frac{1}{4}$ -in. bushing was pressed in the casting and bored for $1\frac{1}{2}$ -in. reamer. The bearing was fed to the toolbit by means of a reversed tool holder in the tool post, fed by the carriage. The carriage has been moved back in the illustration to afford a better view of the casting and bearing.

size shafts, it is only necessary to drive out the old and insert bushings of the proper size which are to be bored in the same lathe in the same manner and the same degree of accuracy will be obtained from one grind to another even if the jobs are six months or six years apart.

There appears to be both advantage and disadvantage in having the bearings solid instead of hinged. Rollers could be more easily installed if the bearings were hinged because the roller could be laid in the open bearings, but they would cost more to make.

The boring bar and reamer are kept exclusively for making the $1\frac{1}{2}$ -in. hole in the bearings at any time new bearings should be necessary, and the same procedure is followed with other sizes as the Tampa Daily Times accepts rollers from other newspapers, and the shafts come in various sizes. The same castings are used and two new bushings are made for each size of roller-shaft with an outside diameter to fit the hole in the castings.

In regard to the idea for increased business for machine shop operators

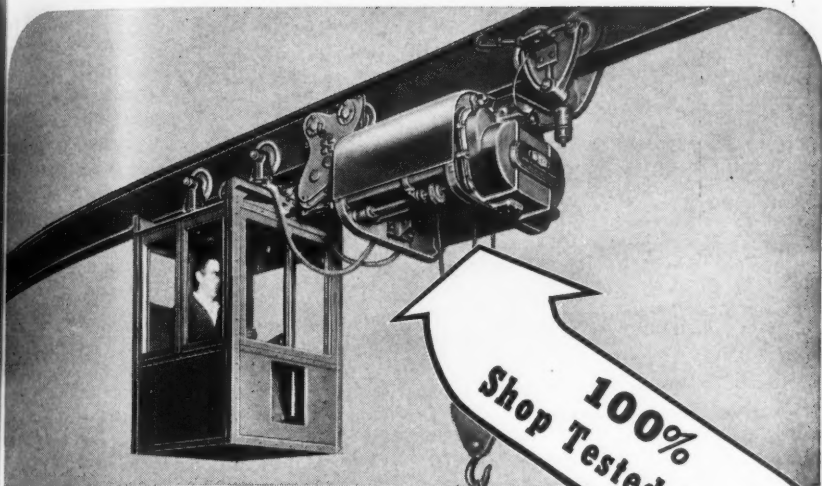
who care to prepare for this type of business; sometimes a shop can make arrangements to grind for all the newspapers in the town provided they do not have their own equipment. The scheme has been worked out in several places and all parties are well satisfied.

Prices for the work vary some, but mostly the average is about 15 cents an inch for a roller 6 in. in diameter and smaller. A roller 6 in. by 70 in. would cost \$10.50 for refinishing.

With the setup described here an average of two rollers per eight-hour day can be produced, based on average good rollers and after all the "bugs" are worked out and the operator has learned what to do to produce a roller acceptable to the press foreman.

Rubber rollers are ground with a coarse wheel, most of them being made especially for this work. The accepted surface speed in both factory and grinding shops ranges from 7500 to 9000 ft. per minute. Some of them get it with 10-in. wheels and 1 and 2 h. p. motors on angle plate grinders.

Others use small wheels and high



**100%
Shop Tested Here**

Be sure you order **THE** hoist that is thoroughly tested under actual operating conditions before it is shipped. Let the nearest A-E-CO representative* explain how the shop-testing of Lo-Hed Hoists assures reliable performance in your plant. Ask him to explain Lo-Hed's exclusive features that give you fast, dependable operation with minimum maintenance cost. Let him show you Lo-Hed's uses in scores of industries. Find out why Lo-Hed is the logical hoist for **EVERY** purpose and why it is the only hoist for low headroom conditions. A-E-CO Lo-Hed Hoists are built in many standard models, from $\frac{1}{4}$ to 12 ton capacities.

**To Prevent Breakdowns
Here**

*Classified phone directories list the local A-E-CO representative in principal cities. Call him in . . . or write us for the new hoist catalog.

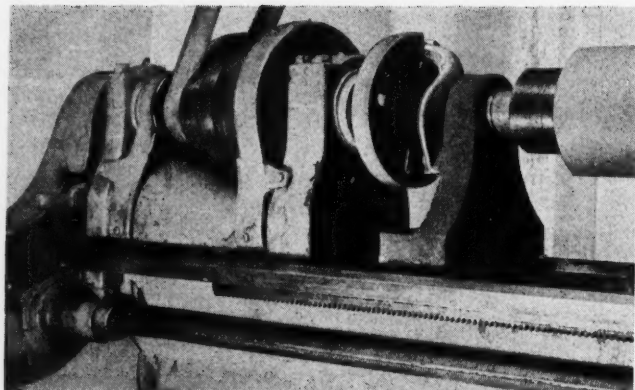
Other A-E-CO Products:
Trolley Stoker Units •
Marine Deck Auxiliaries
• Hoist-Show Field Power.



**A-E-CO
Lo-Hed
HOISTS**

AMERICAN ENGINEERING COMPANY

2451 ARAMINGO AVENUE, PHILADELPHIA, PA.



Bearing, dog, and faceplate in place, showing finished roller.

speeds and get the proper surface speeds. The plant under discussion selected the No. 7 Dumore grinder made by The Dumore Company at Racine, Wisconsin, as being best suited for the work. Because of its high range of speeds and perfect balance and its accuracy to one ten thousandth of an inch, it was figured that any rubber grinding speed necessary could be obtained and the grinder would still be versatile enough to be used on other work, both external and internal.

In remodeling the South Bend lathe it was kept in mind that it would be an advantage to keep the lathe intact and usable as an ordinary lathe. It will be noticed that all that has to be done to use the lathe for other work is to remove the two cast iron bearings which are clamped to the ways and set the tailstock on. If it is a grinding job, the grinder merely needs to be adjusted and "wheeled" for the job at hand. If a turning job, the grinder is slipped off and the regular tool post put on. Thus the machine is not tied up for roller grinding when there are no rollers to grind and other work is to be done.

Five-inch wheels made for Dumore and balanced by them for the high

wheel.

Two wheels dressed to full face are kept on hand; one for rough cutting and one for finishing. For rollers they might be described as only half dressed, the face of the wheel is beveled so that the cutting edge is about $\frac{1}{4}$ inch wide. For very bad rollers, many of which might be considered as reclaimed from the junk pile, a wheel dressed at an angle to a knife edge is used with the edge but slightly relieved on the straight side. Much of this will be arrived at by experiment. The reason for dressing these different faces on all the wheels was so that the wheel would not be materially reduced in diameter by continued dressing and thus all the surface speed possible was retained.

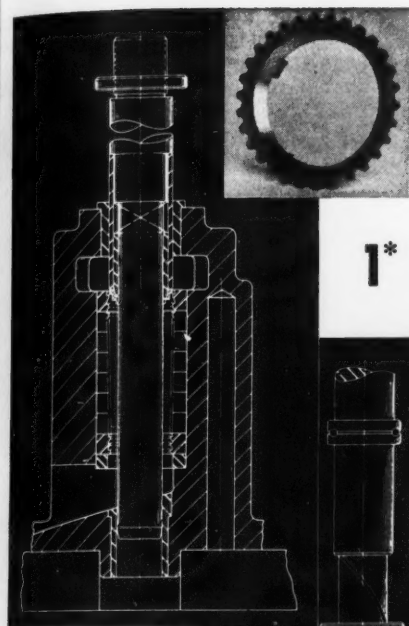
The lathe spindle speed for the average roller is about 135 r. p. m. and the transverse feed is about 2 in. a minute at that speed. The spindle is speeded to about 600 r. p. m. for polishing and the rollers are polished with three grades of paper; 60 grit, 150 grit and 240 grit. It was found, however, that the 240 grit did more harm than good. After the roller had been polished with the other two, and was pretty smooth, the 240 seemed to load up and scratch.

speeds of the grinder were used. Because of the great many rollers are handled that are very soft and difficult to grind, six of these wheels were purchased and the faces were dressed differently for use on different types of rollers. On good rollers it is wise to use the full face of the

3 JOBS 3 FIXTURES *but only*

1* Broaching Machine

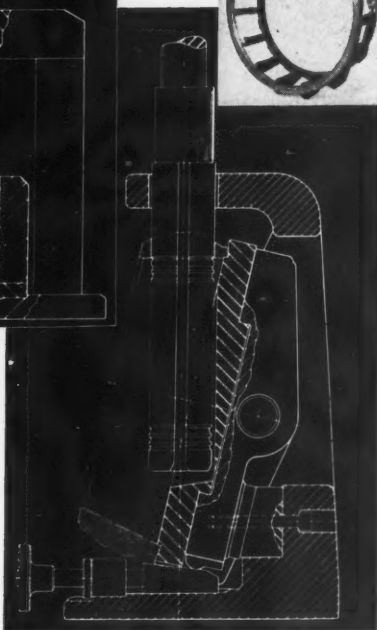
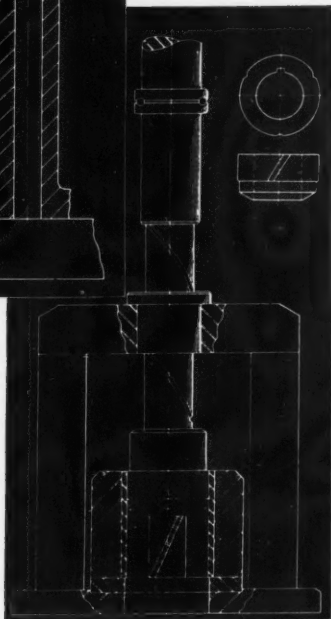
***Colonial
Utility
Broaching
Press**



Above: Broaching external teeth on a synchronizer ring.

Center: Spiral broaching of oil grooves on guide bushings.

Below: Broaching roller bearing cages for Diesel trains.



Just one Utility—or Light Duty—Broaching Press may solve a dozen or more machining problems in your shop—better, quicker, and cheaper. Usually another job means just another fixture and broach.

This flexibility is the reason why manufacturers with job-lot problems find one of these Colonials just about the best investment they can make.

Send for Bulletins No. 104-9d and 104-9e

COLONIAL BROACH COMPANY
147 Jos. Campau Detroit, Michigan

At present the finishing is done almost all together with the Dumore grinder and Dumore wheels, which has speeded up production considerably. In finishing with the wheels, the grinder is speeded up to 6500 r. p. m., which is safe, using these especially balanced organic bonded wheels.

The depth of cut on the finishing cut is from 0.0015 to 0.003 in. In actual practice, the roller is covered with a good coating of powdered soapstone which is used in all operations. Then the wheel is set just close enough to about knock the soapstone off, the spindle turning about 90 r. p. m. This operation usually leaves a smooth surface and may be repeated several times. This is a good place to experiment with speeds. A finished roller has been turned out with the lathe turning at 600 r. p. m. and the transverse feed making its trip in 15 to 18 minutes.

The rough cutting is done as with other work. Where it is necessary to reduce the diameter of the roller to certain limits, as much is taken at a cut as possible with the grinder working fast and the lathe working comfortably. Some rollers are reduced in one cut, some in two and some in three. Some rollers can be ground in one cut in 35 minutes, but others which are bad will take as long as two hours. All these operations are carried out without smoke and but little rubber odor.

The Dumore is ideally suited for this work as the motor and quill are completely closed to dust. The motor is cooled by a forced draft through a filter which catches the flying soapstone and rubber particles.

So far no cooling system or exhaust system has been added. Both could be easily worked out so that all the chips would be carried out with the soapstone.

A sensible question might be asked as to the number of rollers used in a

plant the size of the Tampa Times. The Times press fully equipped has 96 rollers on the press. Necessary spares increase the stock of rollers to 125 to 150.

A rubber roller in average good condition and under average running speeds will run for six months or more before it needs grinding again. A new rubber roller 6 in. by 70 in. will cost between \$80.00 and \$125.00. Thus a rubber roller under average refinishing costs may be ground for about \$10.00. The Tampa Times cost for refinishing these rollers is under \$5.00 each, taking the easy ones and the hard ones as they come, and including power, labor, lights, wheels and incidentals.

Producing Modern Machine Tools by Modern Methods

(Continued from page 48)

The illustration Fig. 12 shows one side of the assembly department. A line of Atlas bench lathes ready for shipment can be seen in the foreground, and in the background is a crew of assemblers assembling and testing these lathes.

Conveyor Chains. Bulletin No. 63, a 40-page illustrated booklet, presents the various Baldwin-Duckworth chains designed and manufactured primarily for conveying purposes under four classifications, as follows: Steel Replacement Conveyor Chains, Extended Pitch Steel Conveyor Chains, Standard Long Pitch Conveyor Chains, and C.P.S. Single Chain Conveyor. Numerous drawings, charts and specification tables are included. Various types of attachments are described.

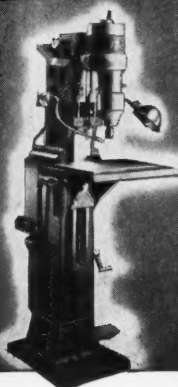
Copy of Bulletin No. 65 free to any mechanical executive who will address a request to Baldwin-Duckworth Chain Corporation, Springfield, Massachusetts.

Note New Services Directory on page 197 of this issue.

Haskins GIVES YOU..

NOT ONLY THIS

BUT THIS, TOO



The Haskins High Speed Tapper—combining speed, precision and construction features found in no other tapping machine.

The Haskins Engineering Service—devoted to helping you find the fastest, simplest and most economical way to solve your tapping problems.

Haskins regards it as plain good business to help you get out of the Haskins Tapper all of the speed, precision and long life built into it. That is why in so many plants today fixtures designed by, and methods recommended by, Haskins Engineers are helping to set new performance records on every type of tapping job.

Would you like to know more about the Haskins Method of High Speed, Precision Tapping? Write for complete details and further examples of the many savings it has brought. R. C. Haskins Company, 4667 W. Fulton Street, Chicago.

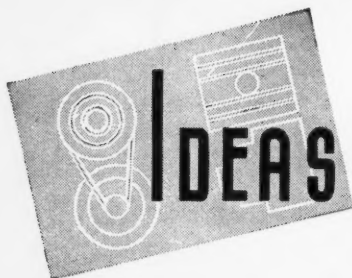
HASKINS PRECISION
Tapping
Equipment



FOR EXAMPLE

Tapping spectacle frames was a problem until the sensitive Haskins tap head and a special air jig that raises and lowers the frame to and from the tap were put to work on the job. Tap breakage and stripped threads were eliminated; production shot up, costs down.

EUROPEAN REPRESENTATIVE—G. E. MARBAIX, LTD., HUMGLAS HOUSE, LONDON, S. W. 1.



IDEAS FROM READERS

Planer Attachment for Contour Cutting

BY RAY G. PINKALLA

THE planer attachment illustrated herewith, in use in the shop of the National Service Company, Milwaukee, Wis., was developed by the

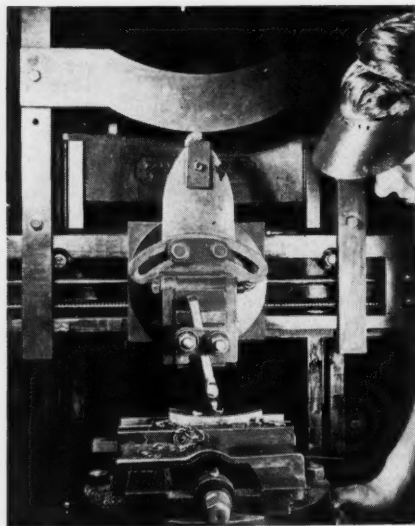


Fig. 1—Attachment for Contour Cutting on the Planer

firm mentioned for use in connection with the building of the special machines, dies and other tools which comprise the product of that firm. The use of this device simplifies the task

of machining radial contours and thus increases the efficiency of the planer to a marked degree. The model shown in the illustrations was made for use on a small shaper-planer, but it will work equally well on a larger machine.

The illustration Fig. 1 shows the tools in operation on the job of cutting a radius in a small steel block which was machined for illustration purposes. The real value of the device becomes evident when long contours, male or female, are to be cut.

The several parts of the device are shown in Fig. 2. The two upright supports, A, are of $\frac{3}{8}$ x 2 in. flat steel and the two upper jaws E are of the same flat steel stock, but are approximately 4 in. long. These jaws are made to fit the planer rails and are to be attached to the uprights by the use of $\frac{1}{2}$ -in. machine screws, inserted through previously-drilled holes. Arc-welded stays, B, are provided to steady the upper jaws. The stays are of $\frac{3}{8}$ x 2 x 2-in. steel and are welded to the supports directly above the upper jaws, as shown. The two lower jaws D D are of $\frac{3}{8}$ x 2 in. flat steel, 2 in. long, and are permanently arc welded to the bottom ends of the upright supports.

The contour to be produced is governed by the design of the template C, which is supported in position by machine screws with which it is attached to the uprights, as shown. The contour of the template is determined by

"Gu
Ship

Ry
ation ar
of heat tr
and exact

This
the outsta

Ry
exacti
stock.

For h
and quick

JO
CH

RY

September



"Guide to Treatment" Shipped With the Steel



Ryerson Certified Alloy Steels are not only shipped quickly, but complete information arrives with the bars, including chemical and physical properties and record of heat treatment results. In this way, the heat treater knows what is in each alloy and exactly how to treat it for the best possible results.

This unique alloy plan, never before attempted by any steel service company, is the outstanding feature of Ryerson Certified Steels.

Ryerson Certified Carbon Steels, Tool Steels and Stainless Steels are ordered to exacting specifications and pass rigid inspection before they are accepted for Ryerson stock.

For high, uniform quality, specify Ryerson Certified Steels. They cost no more and quick shipment is assured.

JOSEPH T. RYERSON & SON, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON STEEL-SERVICE

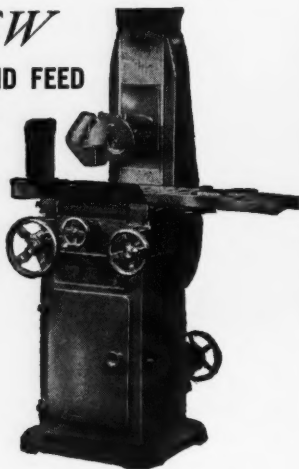
CENTRALIZED CONTROL

FOR

CONVENIENCE

NEW

REID HAND FEED
SURFACE
GRINDER



Capacity
6"x18"x11"

1. The head elevating hand-wheel is located beside the table hand wheels, promoting ease of operation.
2. An improved grinding head provides for simple adaptation of various types of spindles.
3. Dust guards protect all bearing surfaces from abrasive dust.

Write for Circular No. 2-A.

REID BROTHERS CO., Inc.
BEVERLY **MASS.**

the contour required on the work piece; in the case illustrated, the contour desired is a 12-in. radius. Set as shown in Fig. 1, the template guiding the tool in the cutting of female radius. When the template

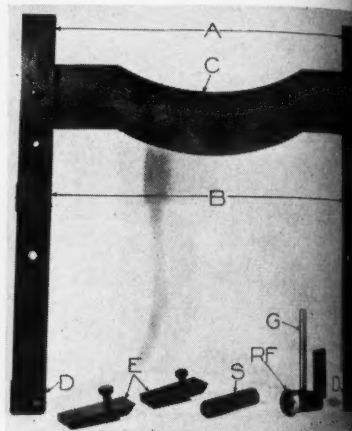


Fig. 2—Parts for Planer Contour-Cutting Attachment.

turned around so that the roller guides the tool upward, rather than downward, the male member can be machined.

The steel spring S, Fig. 2, is 6 in. long. No specific dimensions are given for the spring as they will vary according to the demands of the job. The roller-follower RF is made of 1 x 2-in. flat steel stock bent to form

STRAIGHT - CIRCULAR - IRREGULAR CUTTING OF SHEET METAL



BEVERLY cuts flat to any size or shape. Three sizes: No. 1, weighs 16½ lbs., cuts up to 14 gauge. No. 2, weighs 32 lbs., cuts up to 10 gauge. No. 3, weighs 50 lbs., cuts up to 3/16 gauge. Write for circulars and prices.

BEVERLY
Throatless Shear Co.
3004 W. 111th St.
Chicago, Ill.

the work
d, the ca
is. Set
emplet
ting of
emplet

ur-Cutlery

e radi
her than
r can be

is 6 in
are given
vary as
the job
de of 4
to form

REGULAR
CAL

to be set
ree diam
No. 1
up to 12
heights 1/8
6 gauges
and prices
Y
or Ca.
st.

September, 1938



ILLUSTRATING A FEW FROM OUR COMPLETE LINE

For tool and die making . . . for all similar work where superior workmanship and extra fine files are needed . . . Nicholson X.F. Swiss Pattern Files are made in a wide variety of shapes and sizes and up to seven numbers of cut.

These precision files are produced in a large department of the Nicholson File Company especially equipped for the purpose.

X.F. Swiss Pattern Files are made from selected file steel, with all the care that is typical of Nicholson production methods. You can always

depend on their uniformly high quality and their ability to do your precision filing with the maximum efficiency.

Warding, Equaling and Joint Files, supplied in regular thicknesses, may also be obtained in minimum quantities of 1 dozen, without extra charge, in many B. & S. Gauges. Nicholson File Company, Providence, R. I., U. S. A.

A FILE FOR EVERY PURPOSE
MODERN MACHINE SHOP 89

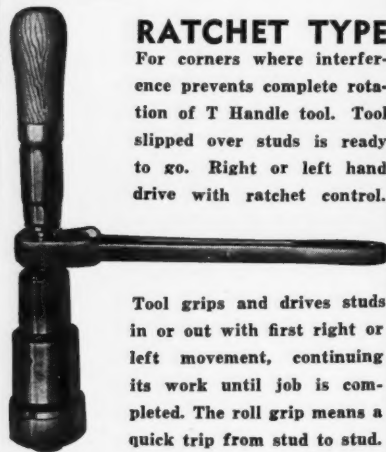
NOW! Set' Studs The Roll Grip Way



**TITAN
STUD SETTER
"T" TYPE TOOL**

**Will Drive
Studs
or
Remove Them**

Placed over stud to be set or removed. Slight left or right hand turn effects tight grip on stud. Release is just a matter of reversal accomplished in a split second.



RATCHET TYPE

For corners where interference prevents complete rotation of T Handle tool. Tool slipped over studs is ready to go. Right or left hand drive with ratchet control.

Tool grips and drives studs in or out with first right or left movement, continuing its work until job is completed. The roll grip means a quick trip from stud to stud.

The TITAN drives studs by gripping unthreaded body of stud. It drives studs having as little as $\frac{3}{8}$ " of gripping surface. Used as a POWER TOOL it may be driven by electric, air, or machine tool equipment. Write for details.

Manufactured under the
Kirkland Patent No. 2069527.

TITAN TOOL COMPANY
FAIRVIEW • PA.



a right angle approximately 4 in. long on a side. A 4-in. section of $\frac{3}{4}$ -in. round cold rolled steel is arc welded parallel to one of the angles and the end of the round piece is turned to fit the roller, which is 2 in. in diameter. The roller-follower guide, G,

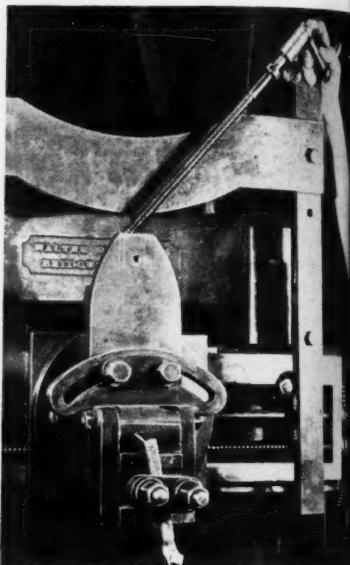


Fig. 3—To assemble the attachment to the planer tool slide, the adjusting screw must be removed.

of $\frac{3}{4}$ -in. round cold rolled steel 8 in. long. The entire roller-follower assembly is attached to the planer head by means of a fillister head screw.

To install the roller-follower, the vertical hand feed screw is removed from the tool slide as shown in Fig. 1. The manner of assembling the roller-follower and spring is shown in Fig. 4. In Fig. 1 the roller-follower is shown in place and secured to the planer head, and the entire device is shown mounted on the planer rail with the tool and work in position.

An important point is that the radius of the templet is equal to the

I'M A FUGITIVE

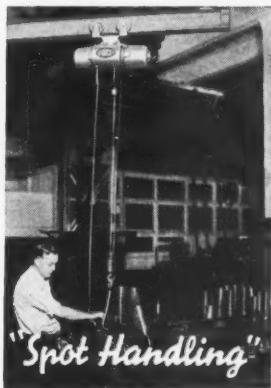
FROM THE CHAIN BLOCK GANG!

"No more yanking on old-fashioned chain blocks. I just press buttons to get work on and off the chuck. I get more done with less effort . . . and it's costing the company less. That's why the other boys are getting Zip-Lifts, too."



HOW THE Zip-LIFT FREES SKILLED HANDS SAVES TIME AND MONEY

That's the way it always goes! Once you try a Zip-Lift, you'll find that it quickly pays for itself with faster, more accurate handling of heavy pieces on and off machine tools. It's easy to install; just hang it on a hook, jib or trolley and plug it in. Frequently, one Zip-Lift can serve two or three machines. Why not get cost figures on actual case studies? . . . see how much you can save? The coupon makes it easy.



The Zip-LIFT stops waste with

"Spot Handling"

**WANT
THE WHOLE
STORY?**

SEND THIS:

HARNISCHFEGER
CORPORATION

WELDS • WELDING ELECTRODES • MOTORS • EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

Harnischfeger Corporation,
4535 W. National Avenue,
Milwaukee, Wisconsin.

Send copy of Bulletin H-2,
"Handling Costs Are on the Spot."

Firm Name

By..... Title.....

Address

City..... State.....

radius of the contour to be cut, minus the radius of the roller. Theoretically the roller is guided on the templet at its center, but in actual operation the horizontal planer feed advances the planer head across the rail while the spring is imparting tension to the



Fig. 4—Illustration showing manner of assembling the roller-follower assembly to the tool slide.

roller-follower in its contact with the templet, the templet serving only to guide the tool in its contact with the workpiece. Properly assembled, the device works smoothly and accurately.

(Photos by Pinkalla & Ross, Milwaukee, Wis.)

Grinding Right and Left Hand Tungsten Carbide Tools

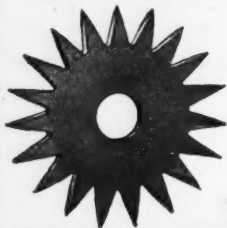
By E. W. DAUM

IN order to facilitate the grinding and honing of right and left hand tungsten carbide tools it has been customary either to use a grinder with a reversible motor or to change the cup wheel from one side of the grinder to the other, necessary to prevent the shanks of the tools from coming in contact with the cutting faces of the wheels.

For example; if the grinding wheel is on the right side of the grinder only a right hand tool can be ground, and for grinding a left hand tool either the wheel must be placed on the other end of the spindle or the direction of rotation has to be reversed — either of which is objectionable.

Both right and left hand tools can be ground on the same wheel without either changing the wheel or reversing the motor if the face of the grinding wheel is beveled at an angle of approximately 15 degrees, as shown in the illustrations. The drawing Fig. 1 shows the position in which a left hand tool should be held for grinding the cutting edge. Without the angle on the wheel, the tool could not be ground unless either the wheel

THE CHAMPION LINE



Leaders in
quality
and design—
winners
on merit
and performance.



Toolholders, Expanding Mandrels,
Shop Furniture, Emery Wheel Dressers
and Cutters, Etc., Etc.

Write for Catalog

The Western Tool & Manufacturing Co., Springfield, O.

DRILLED-MACHINED Nor EXTRUDED

But--

Forged

Exclusively
HOLO-KROME



ON THE JOB
is the place to **TEST**
THEM.

State size, etc., enough
for your test will be
SENT FREE

FIBRO
ORGED
TRADE MARK

Socket Screws

Patents owned, controlled and exclusively utilized by HOLO-KROME.

HOLO-KROME

THE HOLO-KROME SCREW CORP. HARTFORD, CONN., U. S. A.

or the direction of spindle rotation were reversed.

The drawing Fig. 2 shows how a

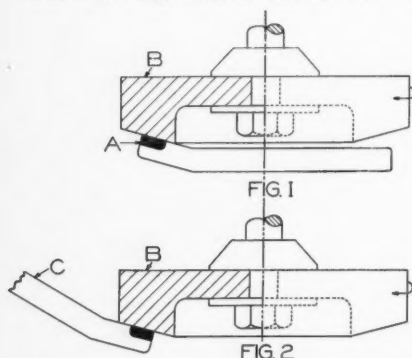


Fig. 1—Grinding Wheel Dressed to 15-Degree Angle for Sharpening Both Right and Left Hand Tools.

right hand tool can be ground on the same wheel. The wheel can either be dressed to the angle required or pur-

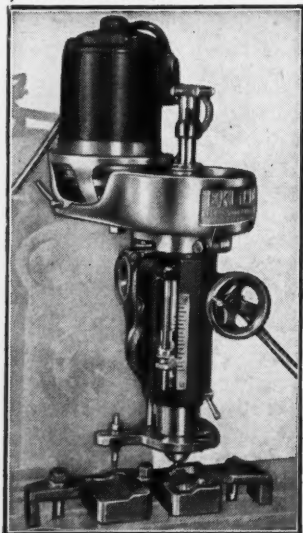
chased with a beveled face; the latter method is, of course, more economical. Wheels for honing can be dressed or purchased the same way. With one grinding wheel and one honing wheel shaped or dressed as shown in the illustrations, the sharpening of carbide tools becomes a simple matter.

Trepanning Tool for Sheet Stock

By W. M. HALLIDAY
England

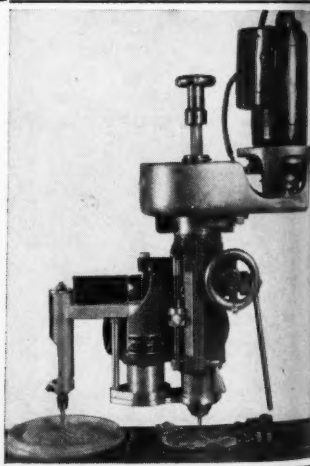
THE usual method of machining elongated holes or slots in thin sheet material consists in drilling a series of holes and then in some manner breaking out the stock remaining between the holes, after which the rough points and edges are smoothed by filing or some similar means. Many tools have been designed to overcome the difficulties associated

EKLIND UNIVERSAL MILLING, DRILLING & BORING HEAD



Has correct speeds for end mills from 1/16"-3/4". With 4 inch Quill Feed.

A fast and accurate hydraulically operated duplicator. "Extremely sensitive." Follows thin templates or soft wood and plaster models.



HYDRA-SPEED DUPLICATOR

Write today for Circular and Trial Offer.

UNIVERSAL HIGH SPEED TOOL CO.

549 W. Washington Bl.

Chicago

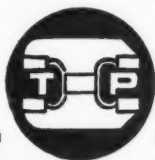
Until you grow
an **EXTRA**
HAND...



*...do all your indicating work
on a Taft-Peirce Bench Center*

You don't feel the need of three hands, when you work with a Taft-Peirce Bench Center. One hand does the work of two... holds the work, and withdraws the spring center with a lever. No danger of dropping and damaging work. And for extra safety on heavy jobs, spring

center can be locked in place. Accuracy is safeguarded by T-slot alignment of head and tailstocks. No shims are used. Standard model can be fitted with dividing head, sine bar indexing face plate, or gear rolling fixtures, as extra accessories. Write for sizes, specifications, prices.



THE TAFT-PEIRCE MFG. CO.

WOONSOCKET, RHODE ISLAND

September, 1938

MODERN MACHINE SHOP

95

HANDEE

TOOL OF 1001 USES

SATIN SMOOTH and FAST AS LIGHTNING

Since it was originated eight years ago, thousands of Handees have been put to work in metal working shops, factories, tool rooms, repair shops, laboratories, etc.

**ACTUALLY,
A WHOLE SHOP
FULL OF TOOLS
IN ONE,**

The Handee can be operated wherever there is an electric outlet. No cumbersome shafting, pulleys, etc., required. Just plug the Handee in any AC or DC outlet, 110 volts and let her go!

Uses 200 different accessories, quickly interchangeable in easy-working chuck.

Does precision work on delicate mechanisms, repairs machine parts without dismantling machine, used on production lines. Indispensable for work on all metals, alloys, glass, plastics, wood, stone, bone, etc.

Try a Handee. You'll find it the finest, fastest, most powerful tool for its type and weight, 12 ounces.

*Order on 10-Days Trial or
Send for Catalog.*

CHICAGO WHEEL & MFG. CO.
1101 W. Monroe St., Dept. 00, Chicago, Ill.

M. M. S. 9

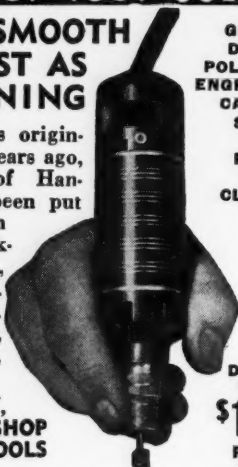
- ☐ Send catalog
☐ Send De Luxe Handee on 10-Days Trial

Name.....

Address.....

City.....State.....

GRINDS
DRILLS
POLISHES
ENGRAVES
CARVES
SANDS
SAWS
ROUTS
CUTS
CLEANS
ETC.



De Luxe
Model
\$18.50
Postpaid
with 6
Accessories

with this method, but the writer has found none as effective as the tool illustrated in the drawing Fig. 1. Not only does the tool work satisfactorily, but it is cheap to make and to keep in repair.

The drawing Fig. 2 illustrates the manner in which the holes are drilled

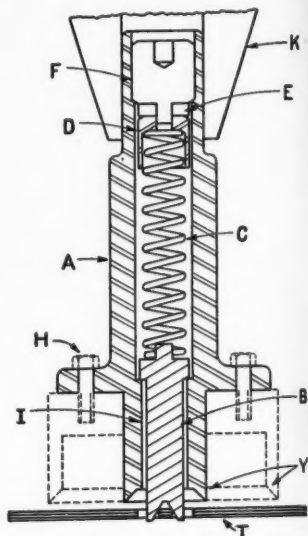


Fig. 1—Trepanning Tool for Sheet Material

for an elongated aperture. The white circles represent the holes that are drilled in the material and the shaded portions represent the material left between the holes to be removed by other machine or hand work. The holes should be drilled closely enough together so that the section left between them is only $\frac{1}{8}$ to $\frac{1}{4}$ in. wide at the narrowest part.

The important feature of the tool is the pilot B, which is machined at the bottom end to form a vee, thus producing a pair of "legs" which straddle the bridge of material between the holes and hold the trepanning tool steady while the cutters

FREE: These 3 New Tool Bulletins



Interesting and Instructive
Send for Them Today . . .

Bulletin No. 200 is composed entirely of blue prints of Davis Boring Tools that are actually in successful operation in various plants throughout the country.

Bulletin No. 300 illustrates and describes Davis Block Type Boring Tools. Contains engineering data of value to the tool engineer and designer.

Bulletin No. 500 illustrates the new Davis single-point Boring Tool which can be adjusted accurately to 0.00025 inch on the diameter.

Write for These Free Booklets Now

DAVIS BORING TOOL DIVISION
 Larkin Packer Company, Inc., St. Louis, U. S. A.

DAVIS BORING TOOLS

severing the greater part of the surplus material from the sheet proper. The pilot B is forced downward by the action of the spring C and remains stationary while the tool revolves.

The body of the tool, A, is of cast



Fig. 2—Drawing Illustrating Method of Drilling Holes for Trepanning.

steel, and is shaped to provide a flange to which cutters or a cutter head, carrying the tools Y, may be attached with the capscrews H. The pilot B is of hardened steel and is made a running fit in the bushing I. The upper end of the body is turned to form a shank by which the tool may be held in a drill press chuck, indicated as K. The shank can be tapered to fit a

spindle sleeve, if desired.

The body is bored through its entire length, as shown, the shank end being threaded for a portion of its length for receiving the check-screw F. In order to prevent the revolving motion of the body A from being transmitted to the pilot B, via check-screw F and spring C, a sleeve D and hardened washer E are interposed between the spring and the fixed screw F. Thus the sliding friction is considerably reduced and the tendency for the pilot to revolve is eliminated.

It will be observed that the end of pilot B normally projects beyond the cutter teeth for a distance of perhaps $\frac{1}{4}$ in., which is so that the pilot will contact the work first and grip the "bridge" before the tools start cutting. The slot in the end of the pilot is tapered so that it will adjust itself to sections of varying widths or to variations in the spacing of the holes.

Once adjusted in position, the tool

Make a
**BETTER
MOUSETRAP**
and the World will beat a path to your door

... A popular expression, that serves well to illustrate the increased demand for AIR-O-CHEK Air Valves ...

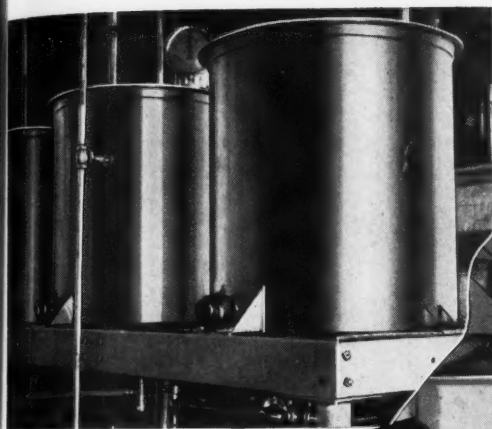
... Definitely BETTER, by virtue of being LEAK-PROOF, STREAMLINED with the hose, and CONVENIENT to use. Operated by a slight flex of the air hose. Used by the largest Industrials in America, in Factories, and Machine Shops, or wherever compressed air is required for cleaning. Made of bar-brass and stainless-steel, in $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ " sizes ... Priced from \$1.25.

Order a SAMPLE Air-O-Chek NOW — for 30 day Free shop trial. ... Guaranteed to satisfy — or may be returned for full credit.



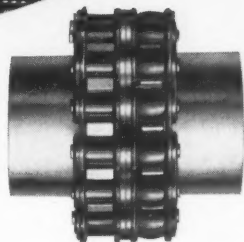
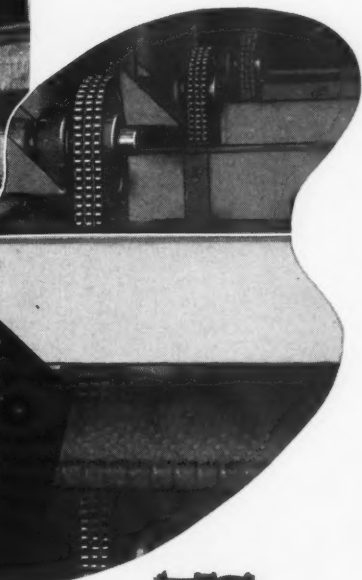
WRITE AIR-WAY PUMP & EQUIPMENT CO. 625 W. Jackson Blvd., Chicago

h its es
 ank en
 n of its
 ck-screw
 revolving
 m being
 a check-
 re D and
 posed be
 ed screw
 is con-
 cendency
 minated
 e end of
 rond the
 perhaps
 pilot will
 rip the
 art cut-
 he pilot
 st itself
 s or to
 e holes.
 the tool



B-D triple strand roller chain gives the Wheatley Mayonnaise Company smoothness and control in their mixing tanks AT LOW INSTALLATION COST.

ROLLER CHAIN
Cuts Costs
HERE



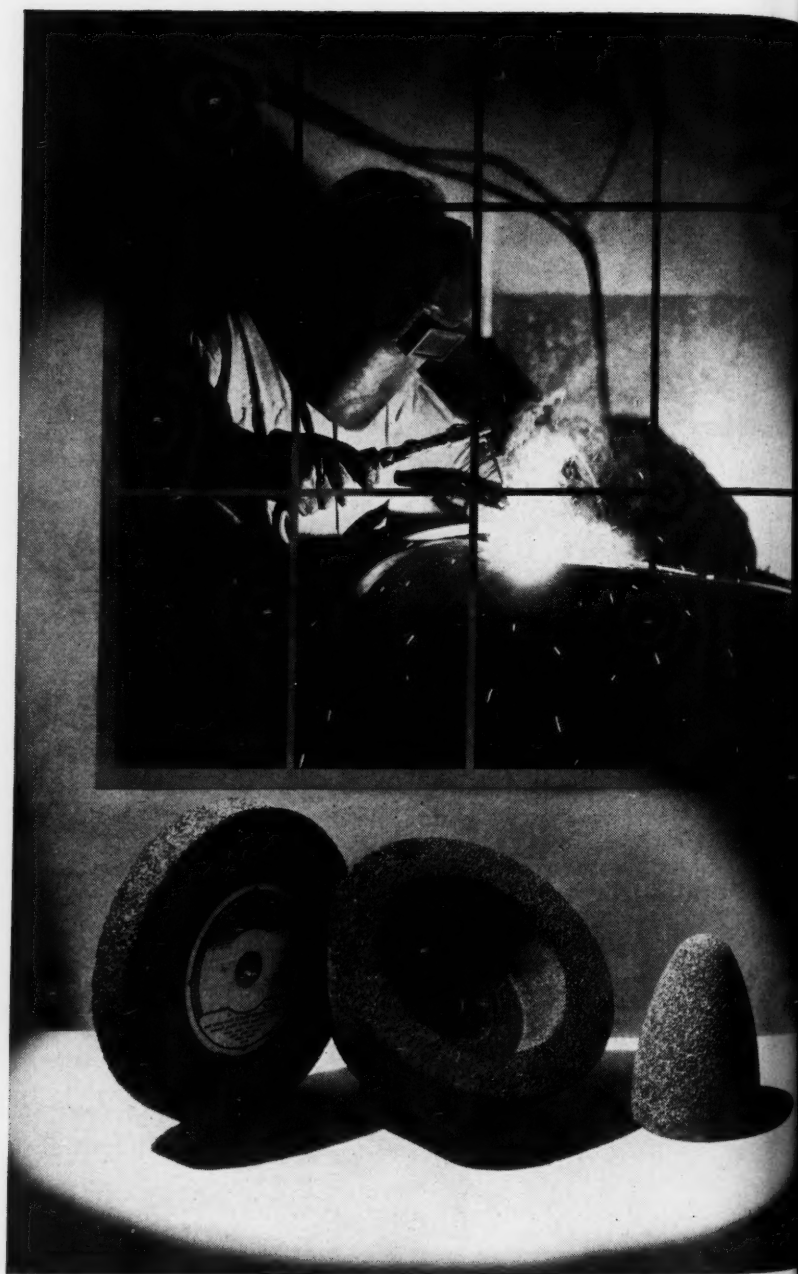
The B-D Flexible Coupling with the convex rollers is worth investigating. Send for bulletin No. 63.

● Somewhere in every plant is a power drive problem that is best handled by roller chain. If you want this drive located and economically engineered—call the B-D man.

BALDWIN-DUCKWORTH CHAIN CORPORATION
Springfield, Mass.

Factories at Springfield and Worcester





or Fast Cutting
and Good Finish . . .

NORTON WHEELS on Your Portable Grinders

THESE are the two important requirements of wheels for grinding welds—fast cutting to quickly remove the excess metal, a smooth surface for the subsequent finishing operations. There are Norton Wheels that are developed especially for the job—straight wheels, cup wheels, cone wheels—vitrified rubber or resinoid bonded wheels of hard, tough, Alundum abrasive.

NORTON COMPANY
WORCESTER, MASS.

W-667



NORTON ABRASIVES

is fed downward until the cutters break through the stock. The small amount of surplus left can be removed with much less labor than was formerly required.

Two "Belt Lap" Kinks

By W. F. SCHAPHORST

MILLWRIGHTS often follow a certain old rule concerning the "correct way" to run belt laps with-

ping and creeping are always toward the tight side of the belt.

Thus on the small pulley, Fig. 1, the slip will be in the direction which tends to smooth the scarfed edge of the joint while on the large pulley the tendency is for the joint to open and cause the feather edge of the lap to roll up. The proper rule in a case of this kind is "Make the small pulley the determining factor." That is, let the small pulley do the smoothing. The large pulley is less likely to cause

opening and rolling-up of the lap.

In some instances the kink illustrated in Fig. 2 may be used to advantage. This drawing shows how, by giving the belt a half-turn, the tendency will be for both pulleys to "smooth" the belt-which is as it should be. This method is applicable if the belt is narrow, but is not recommended for wide belts when the pulleys are close together.

An important advantage in turning a belt in the manner shown in Fig. 2 is that each side of the belt comes into contact with one of the pulleys. Thus the flesh side of the belt comes into contact with one of the pulleys and the hair side comes into contact with the other pulley. The belt fibres,



FIG. 1

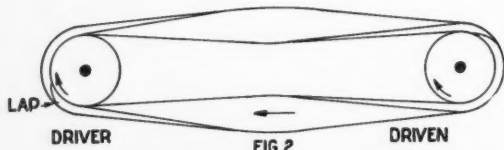


FIG. 2

Fig. 1—The belt should be placed on the pulleys with the lap as shown here so that the tendency will be for the small pulley to "smooth" the edge of the joint.

Fig. 2—By giving one end of the belt a half-turn, the tendency will be for both pulleys to smooth the joint.

out realizing that the rule does not take into consideration the fact that on one pulley the belt slips in one direction and on the other pulley the slip is in the opposite direction. Slip-

"DO IT ON THE MILLERETTE"

A milling attachment for use on Lathes, Drill Presses, Shapers, etc.

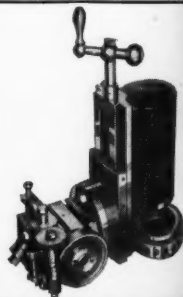
Cuts spur and bevel gears — handles milling and divisional work — key seating — angle cutting — splining — slotting. Simple, speedy and accurate. Sturdy in construction. Quickly pays for itself in shops of every size.

Write for Illustrated Bulletin.

THE PRODUCTION MACHINE TOOL CO.

629 EAST PEARL ST.

CINCINNATI, O.



Are You Trying To Do a 1200 R.P.M. Job In a 400 R.P.M. Milling Machine?

NEW! "THOU-METER"

For setting cutting tools by
DIRECT READING from a stand-
ard counter operated from the worm
shaft. Instant zero setting —
guaranteed accuracy $\pm .00025"$
travel.

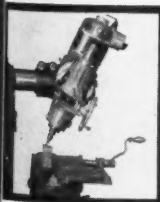
Then you need the NEW DALRAE "MIDGET MILL"

6 SPEEDS 275 to 3200 R.P.M.

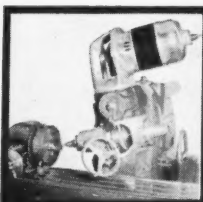
COMPLETELY UNIVERSAL MILLS • DRILLS • BORES

A necessity for the proper use of
end mills. ONE MAN can quickly
and safely set up the "MIDGET-
MILL" for any type of plain or
compound angle. Saves time and
labor, speeds production and in-
creases accuracy in the tool
room, manufacturing depart-
ment, model room, etc. Built
for life long accuracy—adapt-
able to any milling machine.

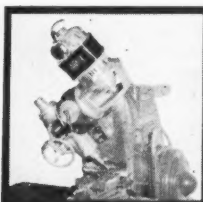
Write for new 16-page
catalog.



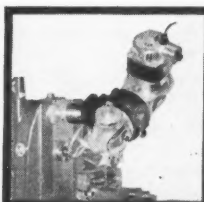
Two minutes to make
this set-up. Forty-six
seconds to remove from
work.



Milling, drilling and
boring set-up on Di-
viding Heads at either
end of hole.



Balanced design makes
angular set-up like this
a one-man job.



Convenience — a com-
pound angle set-up
showing control handle
on inside position.

DALRAE TOOLS CO. 501 E. WATER STREET SYRACUSE, NEW YORK

therefore, are not first bent and rubbed in one direction and then in the other direction. The fibres on both sides of a single belt will always lie in the same direction as the lap — a condition that is ideal.

"Mercury Light for Better Sight", a 12-page booklet published by the General Electric Vapor Lamp Company, Hoboken, N. J., describes the new combination Cooper Hewitt-Incandescent lamps and their uses in industry. Applications of these lamps are illustrated in textile mills, printing plants, machine shops, drafting rooms, fur shops, dry cleaning establishments and general offices.

The arrangement of incandescent lamps with respect to the mercury tube, which blends the light output to give a daylight effect, is indicated by views of the unit. Useful information for computing the proper spacing of combination lamps to obtain any desired illumination level is given in a section of engineering data. In this section, photometric ratings are also listed for both the diffuser unit and the open type unit. Essential dimensions of the

lamps are given and the method of lamp suspension is described.

Copies of "Mercury Light for Better Sight" may be obtained by writing to General Electric Vapor Lamp Company, 897 Adams St., Hoboken, New Jersey.

M. S. A. Salt Tablet Dispenser. A new bulletin describing the M. S. A. Salt Tablet Dispenser, a device designed for the dispensing of salt in tablet form as a preventative of heat sickness, has just been issued by the Mine Safety Appliances Company, Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

Established by medical research as being an efficient method of renewing the supply of salt lost from the system in excessive perspiration, salt tablets dispensed in the new M. S. A. Salt Tablet Dispenser, are now being widely used in large steel mills, foundries, refineries and other companies where hot working conditions exist.

Copies of this bulletin are available by addressing the manufacturer.

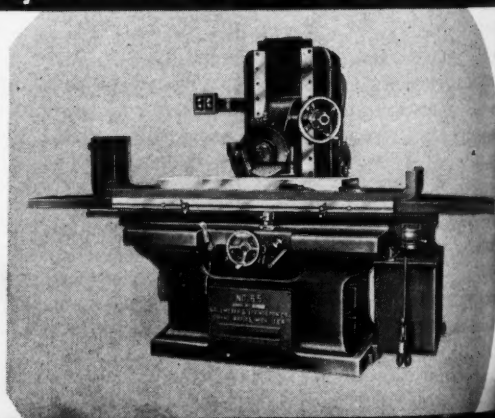
By mentioning MODERN MACHINE SHOP when writing to advertisers you are helping to build a bigger and better magazine in your own benefit.

NO. 65 GRAND RAPIDS Hydraulic Feed Surface Grinder

With this grinder, practically any longitudinal table speed up to 125 feet per minute is instantly obtainable. Vertical adjustments, calibrated to .0001" — rigid, one piece column and base — assure you of the highest degree of grinding precision.

Operated correctly with the proper grinding wheels, you can grind any material at maximum speed.

Write for catalog GL100



GALLMEYER & LIVINGSTON CO.

308 STRAIGHTWAY
GRAND RAPIDS, MICH.

od of lum
for Better
writing the
Company
Jersey.

er. A ne
S. A. has
signed to
et form
ness, in
Safety Ap
Thomas
Pa.
search
renew
the system
tablets
Salt Th
ldely use
s, refin
hot work

availa
er.

INE EN
are bol
gazine

nder

AVE

19



YOU'LL FIND THEY RUN BETTER, TOO!

Reflecting in every detail the many advantages of Buckeye's exacting metallurgical standards and skillful manufacture, Buckeye Bearings will give you a maximum of satisfactory service. Customers say they are a premium product—yet they sell at the standard price. That's why hundreds of manufacturers specify—and insist on getting—Buckeye Bushings. • Send for the Buckeye Catalogs. They list 787 standard sizes of ready-to-use bushings—154 sizes of cored and solid bars, ideal for maintenance work—and 638 sizes of electric motor bearings. Then, like other companies, you too can order Buckeye Bushings—from stock—from the 18 warehouses located at strategic points from coast-to-coast. No obligation. Send for the catalogs today.



SEND FOR THE BUCKEYE CATALOGS

Catalog 137 lists 787 sizes of ready-to-use industrial bushings and 154 sizes of cored and solid bars.
Catalog "O" lists 268 sizes of Electric Motor Bearings.

Send on request. Write today.

No order is too big or too small for Buckeye

Buckeye

BRASS AND MANUFACTURING COMPANY

BRONZESMITHS



SINCE 1900

4412 HAWTHORNE AVE.

CLEVELAND, OHIO

Write Cleveland direct
on blue print and spec-
ification requirements.



Over the Editor's Desk

Overalls Vs. White Collar

ASIDE from the fact that business is slow at the moment and jobs are scarce, much of the unemployment of youth today is due to their scorn of any but white collar jobs, according to a statement made recently by Dr. Ernest L. Bowman, acting manager of the Ohio State Employment Service. The results from two separate investigations have shown that too many young men are waiting or trying for white collar jobs, while with business at all normal, skilled workers in the crafts and trades will be at a premium. One fourth of the white boys covered by the reports were reported as applying or intending to apply for clerical jobs. This is a much larger percentage than can be absorbed.

Dr. Bowman makes the point that unemployment after the age of 40 is practically certain for poorly qualified white collar workers, because they are in danger of being crowded out by better-prepared youngsters. Still, many of these same men would have made good mechanics or skilled workers and would have had a good chance for employment until retirement age in jobs where skill and experience were deciding factors.

One of the most common errors made by youth today is in assuming that once a mechanic, always a mechanic, and that the only way to get anywhere near the top is via the white collar route. Those who have carried this idea will be surprised if they will take the trouble to trace the

careers of any number of the important men of industry.

To begin with well-known names: Henry Ford, Walter Chrysler, R. E. Olds, the Wright Brothers, Charles M. Schwab, the Dodge Brothers, Thomas A. Edison, Glen H. Curtiss, Harvey Firestone, and George Eastman all started at the bottom, in jobs where a white collar would have been a nuisance.

The Wright Brothers were overalls in the bicycle shop where they made the first practical airplane. Henry Ford was a stationary engineer in a power plant. John and Horace Dodge were mechanics working at low wages, until they started their own machine shop. Walter Chrysler was an engine wiper in a locomotive shop. Charles M. Schwab pushed a wheelbarrow in the steel mills.

Your editor knows from his own experience that more than nine out of ten of the men who direct the activities in the great automobile plants started at the bench or machine shop. Practically every one of the superintendents, master mechanics, and even the superintendents of motive power and other executive officers of the railroads of this country started as apprentices in the machine shop. And the names of scores of other successful, well-known men — men who started their careers in the shop — could be added to these.

It is true enough that all of these men eventually came to white collar jobs, but those jobs are not the jobs that fall to the office worker. In a world already highly mechanized and steadily becoming more so, the prizes are going to the men who have built their life's work upon a foundation of practical training. Coupled with the necessary technical education — which can be acquired in spare time, if necessary — such training will give the possessor an advantage which the office worker can never hope to match.

STANLEY UNISHEAR REPLACES OLD CUTTING METHOD-- *Results!*



Job Time Cut 70% Over Estimate.
Salvage of Material \$1.40.
Clean Edges and Better Work.



**No. 16
UNISHEAR
Now only
\$70.00**

**Cuts up to
16 gauge
hot rolled**

**steel, speed as you
feed. Other mate-
rials in proportion. Other
portable Unishears with
capacity up to 12 gauge, station-
ary Unishears with capacity up
to 1/4" boiler plate.**

● That's what happened when Stanley Unishear—"The Electrically Driven Hand Shear"—replaced hand-cutting methods at a Philadelphia manufacturing plant.

● Used to remove a scribed section of 18 gauge Stainless Steel to permit installation of a sink, Unishears do the work three times as fast—save valuable material and do better work.

● For duct work, bus bodies, electric signs, kitchen equipment. There is a Unishear made to handle every job faster and better. Cutting any pattern with hairline accuracy, without distortion of metal, Unishears make a place for themselves wherever sheet materials are cut. Ask your Stanley distributor for a demonstration, or write Stanley Electric Tool Division, The Stanley Works, 137 Elm Street, New Britain, Conn.

STANLEY UNISHEARS

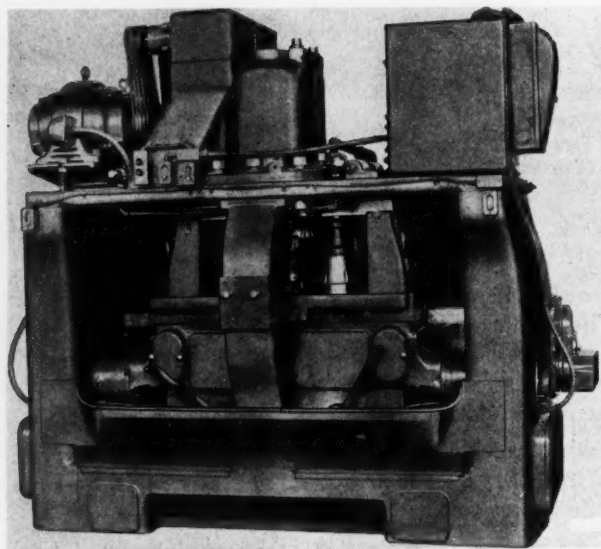
THE ELECTRICALLY DRIVEN HAND SHEARS



NEW SHOP EQUIPMENT

"Rotomill" Turning Machine

A machine to be known as the Rotomill, in which milling cutters are employed to remove stock from cylindrical workpieces at high speeds, has been



"Rotomill" Turning Machine Set Up for Operation

developed by the National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Michigan. It is said that work which is usually turned with a single point tool, including any type of cylindrical, conical, or flanged work, can be machined in the Rotomill with speed and economy.

In addition to fast production, precision is also a feature of the machine. In normal production, parts are held to limits of 0.004 in. at all points, which in many cases eliminates the need for additional finishing operations.

The Rotomill consists essentially of a reciprocating table which carries a

vertical work spindle on each end and two vertical centrally-located cutter spindles one at each side of the table, all assembled in an exceedingly rigid frame. The cutters are of large diameter, each having from 50 to 100 teeth. The

design and arrangement of the cutters is such that the cutter load on the workpiece is balanced; that is, the cutter load on one side of the workpiece is equalized by a similar load diametrically opposite, eliminating the tendency to deflect the work and removing strain from the center bearings.

In operation the table carrying the work spindle moves from loading position and rapidly approaches the cutter spindles. As the cutting begins the rate of table travel is automatically retarded. When the work spindle reaches a point in the plane between the cutter spindle centers, it starts to rotate and continues to rotate through either 185 deg. or 370

deg., depending upon the nature of the operation. When the rotation limit has been reached, the table rapidly returns to its initial position which is the loading station.

As there are two work spindles, it is apparent that one is moving away from the cutters while the other, on the opposite end of the table, is moving from 5 to 7 seconds; the remainder of the cycle is free for changing the workpiece without interrupting continuous cutting.

Cutters are rotated normally at speeds of approximately 130 surface ft. per min. On the basis of 10-in. dia. cutters, this amounts to some 50 r.p.m. The work

spindles
this in
cutting
cutting
up in s
arbor,
matter
be done
mately 2
Another
the rap
may be

Transm
Rotomill
Umach
Spindle

changing
support
feed an
services
approx

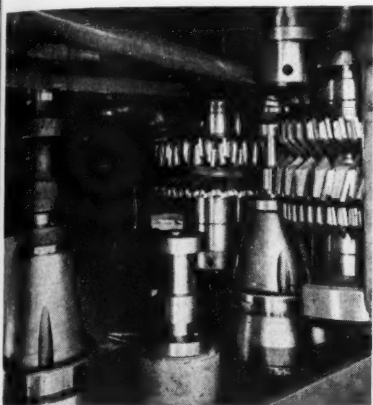
Ameri
Hy

A pu
broach
the Ar
Hydra
placed
Broach
Mich.
quickly
another
broach
venient
machin
tiring
feature
cutting

Sept

spindles are operated much slower than this in order to allow sufficient time for cutting without undue severity on the cutting edges. When cutters are made up in sets and mounted on solid keyed arbors, a cutter change is merely a matter of setting the arbor, which may be done and cutting resumed in approximately 20 min.

Another important consideration is the rapidity with which the Rotomill may be set up for a new job. Including



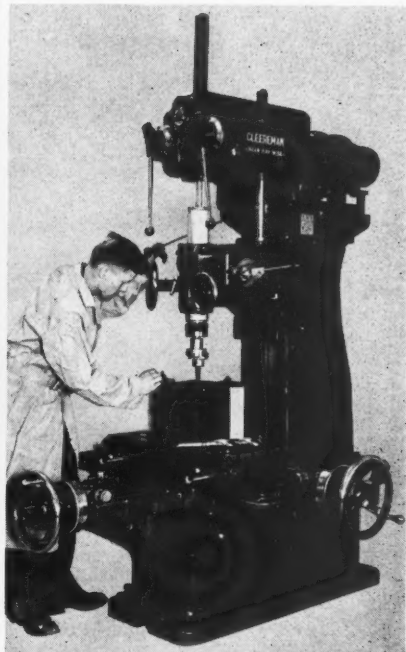
Transmission Counter Gear in Process in Rotomill, Using Inserted Blade Cutters. Note Unmachined Forging on Left Hand Work Spindle and Finished Piece on Bed Between Work Spindles

changing the cutters, with new work supports, speed changes on both table feed and cutter rotation requires the services of two operators for a period of approximately 80 minutes.

American Type H, 2-30 Horizontal Hydraulic Broaching Machine

A pull-type machine for light internal broaching operations, to be known as the American Type H, 2-30 Horizontal Hydraulic Broaching Machine, has been placed on the market by American Broach & Machine Company, Ann Arbor, Mich. The machine can be easily and quickly changed from one operation to another by changing work bushings, broach pullers and broaches. The convenient work loading height and handy machine lever control provide easy unloading work for the operator. These features, together with the smooth cutting action of the machine, are said

ACCURACY CUTS COSTS



(Precision Accuracy) +

Convenience + Perfect Lubrication + Proven Design + Finest Workmanship = Cost Reduction for many leading shops using

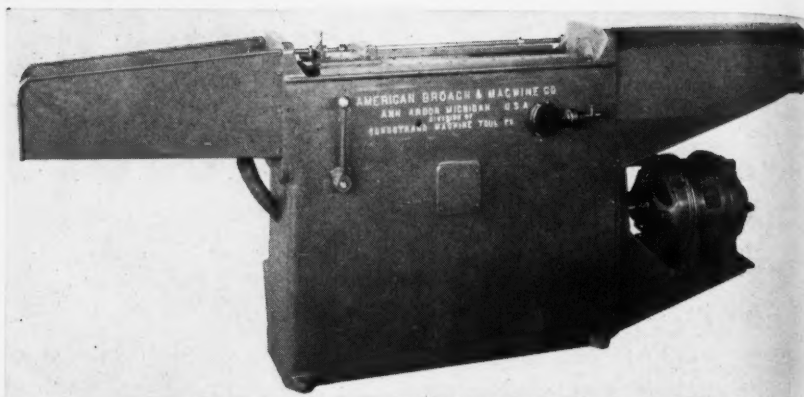
CLEEREMAN

DRILLING MACHINES & JIG BORERS

Cleereman Machine Tool Co.
Green Bay Wisc.

Manufacturer's Sales Division

Bryant Machinery & Engineering Co.
400 W. Madison St., Chicago



American Type H, 2-30 Horizontal Hydraulic Broaching Machine

to afford high production and accurate work. Surface broaching operations can be done in a rapid and satisfactory manner by adding suitable fixtures and tooling.

The machine bed is of heavy box section, well ribbed to support the machine members and the guide ways for the draw head. The bed contains the hydraulic reservoir with the Sundstrand Pumping Unit submerged, and also the coolant tank and chip receptacle in a separate compartment.

The draw head is long and well-proportioned, having a lubricating oil reservoir in its body. The oil is fed to the hardened and ground steel guides which are built into the draw head. Positive lubrication to the guide bars and slide ways provides long life and accurate alignment. A rapid cycle is provided through the use of dual cylinders with ram connections to the draw head, affording a steady, balanced pull on the cutting stroke and providing

a fast movement back on the return stroke.

The normal capacity of the machine is two tons and maximum capacity is four tons. Other specifications are as follows: Stroke, 30 in.; maximum overall broach length, 33 in.; draw head speed, cutting, feet per minute, 26; draw head speed, return, feet per minute, 48; diameter of hole in face plate, 5 in.; capacity of Sundstrand pump, gallons per minute at zero pounds per square inch, 22 gallons; floor space required, width x length, 1 ft. 7 in. x 1 ft. 3 in.; height overall, 42 in.; net weight, 2500 pounds.

Standard equipment includes a flat-type pressure gage with shut-off cock, vane-type coolant pump driven from the motor coupling complete with piping and nozzle, flexible coupling for motor drive, two reducing bushings of 1½x2-in. size, and three threaded shank-type broach pullers of ¾-1½ and 5 sizes.



GREENERD

Arbor Presses

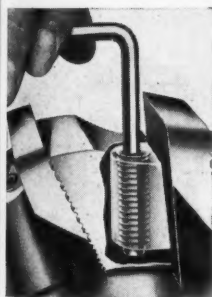
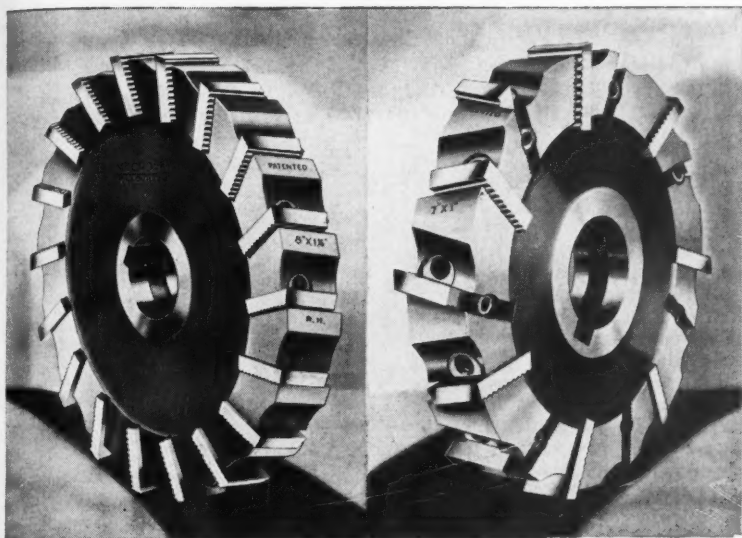
500 lbs. to 35 tons pressure

HYDRAULIC, MOTOR DRIVEN, HAND OPERATED

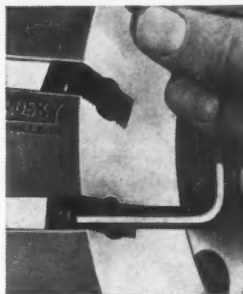
Greenerd Arbor Press Co. Nashua, N. H.



McCrosky JACK-LOCK Cutters



McCrosky JACK-LOCK Wedge and Blade-Adjusting Screw combine assembled rigidity on the job and less down-time for reconditioning.



FINGER PRESSURE on the wrench of the JACK-LOCK Wedge develops powerful and positive locking pressure on the blade. The grip of the wedge can be released just as easily by the same wrench; no pounding with a hammer to lock or unlock. By means of the sturdy screw behind each blade adjustment for regrinding can be made easily, quickly, and with a minimum sacrifice of blade stock. The more you use JACK-LOCK Cutters the less they cost. Complete details and listings in Bulletin 15-M. Send for a copy today.

McCrosky Tool Corporation, Meadville, Pa.

\$1 IN CERROMATRIX SAVED \$50 ON THIS DIE



Courtesy of Adams Stamping Co.

Savings of 5, 10, 50, 100 and more hours in the construction of a single die are everyday performances to users of CERROMATRIX. The photograph above shows a typical case of a piercing die designed by J. G. Tilp, Inc., well known custom die makers for the Adams Stamping Company of Newark, N. J. Twenty hours were saved by mounting the perforating punches in the punch holder with less than \$1 worth of Cerromatrix.

This low-temperature-melting bismuth alloy is hard-setting and expands slightly on solidification, creating a tremendous pressure around each part and holding it firmly in position. Cerromatrix is no temporary makeshift. It is recognized among many of the largest metal-working concerns in the country as a less expensive and better method of securing permanent dies and punches for long as well as short runs. It is widely used also for securing stationary machine parts without the expense of making drive fits.

We also suggest CERROBEND as a filler in tube bending and CERRO-BASE for reproducing master patterns accurately at low cost. Other low-temperature-melting alloys for special applications upon specification.

Write for booklet and prices.

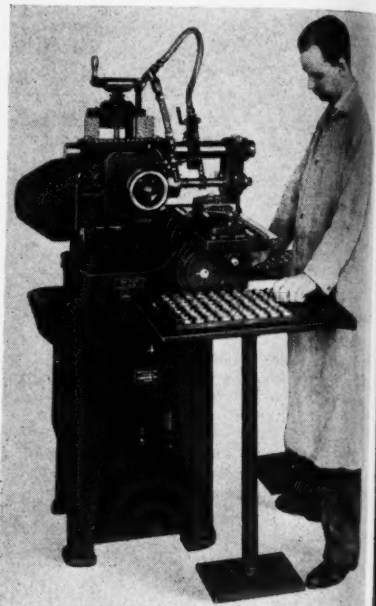
CERRO DE PASCO COPPER CORPORATION

Forty-Four Wall St., New York, N. Y.

British Associates: Mining & Chemical
Products, Ltd., London, England.

Brown & Sharpe No. 000 Plain Milling Machine

An automatic milling cycle with exceptionally rapid advance and return of the table is one of the features of the No. 000 Plain Milling Machine recently announced by Brown & Sharpe Mfg. Co., Providence, R. I. The machine has been designed specifically for the economical, rapid production milling of small pieces such as parts for sewing machines, fire-



B & S No. 000 Plain Milling Machine

arms, electrical apparatus and business machines, and its broad, independent ranges of speed and feed enable it to handle efficiently a wide variety of materials, using cutters down to the smallest end mills.

The table has a longitudinal movement of 4 in. Sixteen rates of feed are provided, 9/16 in. to 24-3/8 in. per minute, and any desired rate is quickly obtained from the front of the table by means of change gears held on splined shafts by retainers mounted on the gear compartment door.

A touch of a convenient control button starts the automatic cycle of table movements and on completion of the cycle, the table stops in loading position.

with ex-
return of
res of the
e recently
Mfg. Co.
has been
economical
small pieces
lines, fir-



machin

business
pendent
e it to
of ma-
small-

move-
ced are
er mil-
obly ob-
by splined
the gear

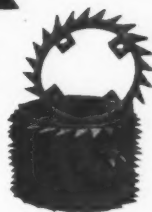
ol brui-
table of
the position.



For HARD WEAR— Specify CASTINGS of METAL MEEHANITE

The alloy steel shell of the big sand pump was cut to shreds in about two weeks by abrasive action. So they adopted MEEHANITE, and now get five to six months' use. Grinding gears, wear plates, liners, crusher rolls, pulverizing hammers—in scores of such uses MEEHANITE greatly outlasts manganese steel, and gray iron many times over.

In small and intricate castings as well as those of great size, the strength, abrasion resistance, corrosion resistance, and other qualities of MEEHANITE lower replacement costs. For specification data, address any of the licensed manufacturers listed below, or Meehanite Research Institute, Vandergrieff Building, Pittsburgh, Pa.



COKE PRICKER RINGS
Strong, Tough, Long Wearing

MANUFACTURERS:

American Laundry Machinery Co. Rochester, N. Y.
Atlas Foundry Co. Detroit, Mich.
Bessemer Iron Works St. Louis, Mo.
Barnett Foundry & Machine Co. Irvington, N. J.
E. & S. Butterworth & Sons Co. Bethlehem, Pa.
Cincinnati Castings Incorporated Cincinnati, Ohio
The Cincinnati Milling Machine Co. Cincinnati, Ohio
Cape Breton Corporation Mt. Vernon, Ohio

Hamilton Foundry & Machine Co. Hamilton, Ohio
Kanawha Manufacturing Co. Charleston, West Va.
Kinney Iron Works Los Angeles, Calif.
Kearney Company Milwaukee, Wis.
M. H. Dietrich Co. Newark, N. J.
Farrel Birmingham Co. Anniston, Conn.
Florence Pipe Foundry & Machine Co. Florence, Ala.
(R. D. Wood Company, Philadelphia, Pa.)
Fulton Foundry & Machine Co. Cleveland, Ohio
Greaves Foundry Company Chicago, Ill.

E. Long, Ltd. Odessa, Canada
Rensselaer Foundry & Machine Co. Pittsburgh, Pa.
Rum-Machan Foundries Chattanooga, Tenn.
The Rogers-Rose Mfg. Co. Denver, Colo.
Vulcan Foundry Company Oakland, Calif.
Warren Foundry & Pipe Corp. Philadelphia, Pa.
Washington Iron Works Seattle, Washington
Austrian Machine Metal Co., Ltd. Watertown, N. Y.
The International Machine Metal Co., Ltd. London
Mechanite Metal Corporation Pittsburgh, Pa.

Fast travel forward at 365 in. per minute is engaged when the table is started. The single table dog engages cutting feed within an accuracy of 1/16 in., reducing non-cutting time to the minimum; and on completion of the cutting feed, fast travel of 737 in. per minute is engaged automatically to return the table to loading position in 1/3 second. Table reversal is dependably accurate to 0.002 in.—a feature of particular advantage when making "blind" cuts.

The alloy steel spindle is carried in a sleeve mounted in the spindle head, and has vertical adjustment of 6 in.; and transverse adjustment of 2 in. Both adjustment handwheels are easily reached from the operating position.

Machine is furnished at customer's option with either of two spindle speed ranges, namely: 160 to 3540 r.p.m. or 107 to 2340 r.p.m. Sixteen speeds are available. Spindle drive is by V-belt and cone pulleys, either direct or through reduction gears. The swivel mounting of the spindle motor by a fulcrum and clamp on the spindle head gives easy release of the V-belt for quick selection of the speed desired. No change gears are required.

Safety in making both table hand adjustments and feed changes is provided

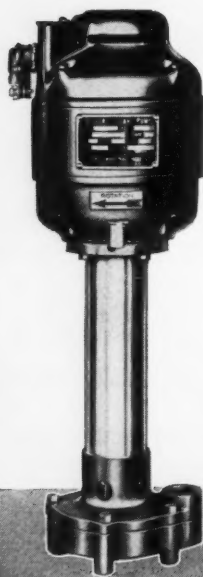
by an electrical contact which disconnects power to the table motor except when the change gear is closed.

Smooth operation is characteristic of this machine. Furthermore, although this is essentially a light, fast machine, there is adequate mass to absorb vibration, and ample rigidity in the stout-ribbed one-piece casting comprising bed and column.

Anti-friction bearings are used entirely throughout the spindle drive, and largely throughout the table drive. Both the 1/3 h.p. spindle motor and 1/4 h.p. table motor are of the totally-enclosed ball bearing type. Positive, automatic oiling of the table ways and entire driving mechanism is provided by a cam-driven pump in the bed, while the spindle driving mechanisms are simply but effectively grease-lubricated through pressure fittings. Protection against dirt and foreign matter is given all working parts.

Six-Spindle Conomatics

Many improvements in performance and operation have been incorporated in the new line of Six-Spindle Conomatics, manufactured by the Crane Automatic Machine Co., Inc., Windsor,

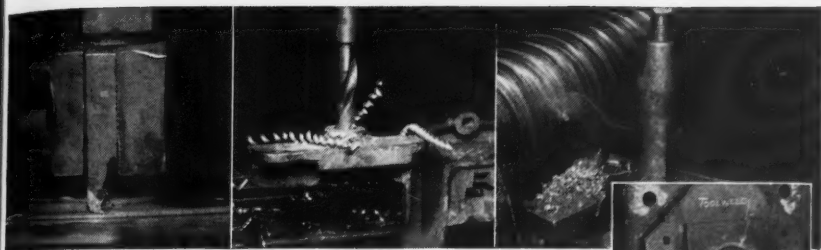


THERE'S A GUSHER PUMP FOR EVERY COOLANT JOB

Ruthman makes coolant pumps to fit ANY cutting need—standard or special.

90 leading machine tool builders have tested, approved and specified GUSHER Pumps because Ruthman meets their demands for dependable coolant flow, easy regulation and low power requirements.

THE RUTHMAN MACHINERY CO.
538 E. FRONT STREET • CINCINNATI, O.



"WE SAVE 60% ON TOOLS AND DIES WITH OUR LINCOLN WELDER"

● A machine shop in Cleveland, Ohio, paid for their Lincoln Welder with savings from tool welding alone. This user says, "We make the shanks and blanks for our tools and dies from plain mild steel. Then with our Lincoln Welder and Lincoln 'Toolweld' Electrode we hard-face the cutting edges, dress them and have a product that wears just as long as tool steel, and we save more than 60%. In addition to these savings which alone have paid for our Lincoln Welder, we also save a lot of money building our

jigs and fixtures and special shop structures. The welder also comes in handy for repair work on broken and worn parts. Our Lincoln Welder is the most profitable investment we ever made."

Machine shops everywhere report savings of \$50 to \$300 per month with this new Lincoln Welder. Since it is of d. c. motor generator type, it will weld metals and alloys of all kinds. It uses as little as 10c worth of power per hour and goes to work at the push of a button. See how it will cut your costs and bring in extra business.

THE LINCOLN ELECTRIC CO.

Largest Manufacturers of Arc Welding Equipment in the World

MAIL THIS COUPON TODAY

**THE LINCOLN ELECTRIC CO.
Dept. E-525, Cleveland, Ohio**

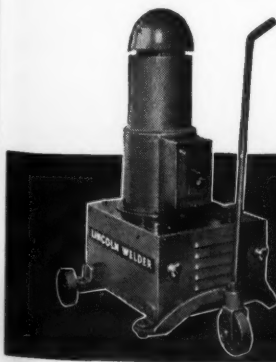
Send a free copy of Bulletin 314 and payment details on the Lincoln Machine Shop Welder.

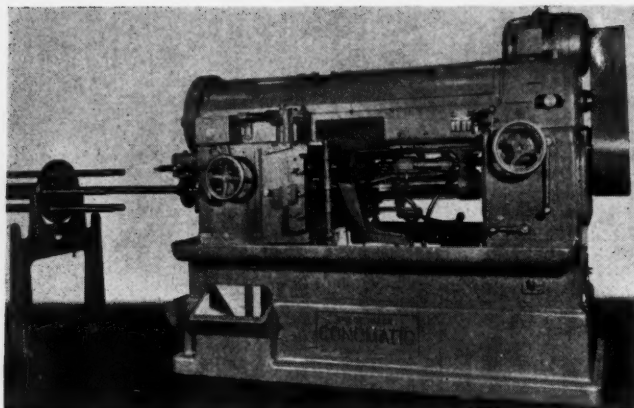
Name Position

Company

Address

City State





Six-Spindle Conomatic

Vermont. One of the most outstanding improvements is the design of attachment driving parts. Open end gearing is now available, and the time required for placing any attachment in operation is reduced to a minimum.

The high and low speed cam action may be disconnected by the operator

when checking tools. Power feed engagement is instantaneous; it operates by a touch of the lever and can be controlled from either side of the machine. Power feed counter-shaft provides a very wide range of feeds and a slow speed for tooling that can be instantly moved to high or production feed. Power feed reverse makes the hand wheel unnecessary and decreases tooling time.

Two formers and a cut-off tool are held in the front slide while forming tools are operated in the rear slide. Six end working positions are provided by the cylindrical turret, and two independent end positions are supplied by the semi-turret. This also operates the stock stop arm, and, by its action, all rebound of the stock is overcome. Two

BEST VALUES ON THE MARKET

L-W 6x6 POWER HACK SAW

\$160.00

A REAL SAW THAT WILL SAVE YOU TIME AND MONEY

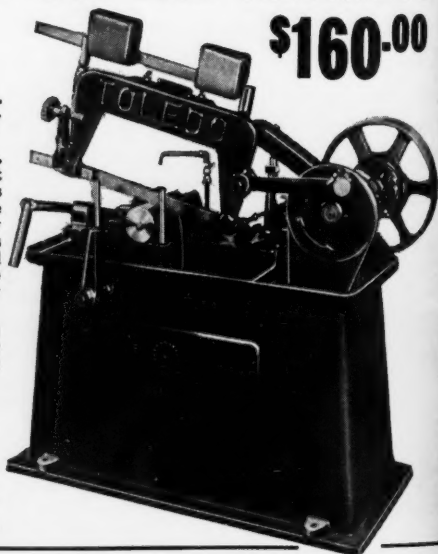
Designed for maximum rigidity, this Saw is accurate and efficient in operation. Automatic trip stops the machine on completion of the cut. Automatic relief of the saw blade on the non cutting stroke is also provided. To make a clean and compact assembly, the coolant pump is mounted inside the base. Capacity is 6"x6" with 14" Blade.

L-W also Manufactures Magnetic Chucks, Demagnetizers, Durning Heads, Lathe Chucks and Milling Machine Vises.

Send for a catalog of the complete line.

L-W CHUCK CO.

20 N. St. Clair St., Toledo, O.



INVESTIGATE THE "L-W" LINE

HERE'S YOUR GUARANTEE OF SATISFACTION IN TAPS



The name "JOHN BATH" on a tap is your assurance of uniform hardness, keen cutting edges and dependable precision thread form, lead and angle.

"Ground from the Solid After Hardening"

BATH'S skilled engineers use patented equipment to grind directly into the ideally hardened, solid steel blank. In this way they produce threads of perfect accuracy and absolute uniform structure from the thinnest teeth edge to the core of the top.

Give BATH Taps a trial—they'll save you money.

JOHN BATH & CO.
WORCESTER • MASS.

more independent end stations are provided by the auxiliary spindle attachments.

High speed drilling, reaming, threading, and tapping are all provided for, as well as roll-turning, knee-turning, roll-supporting and forming. Universal auxiliary cross slides are easily attached to the top-bed for operation in the fifth and sixth positions. The indexing mechanism has been refined and reduction, of wear and noise at all points throughout the machine, has been carefully planned.

"Bliss" 4L-7½-84 In. Four Point Single Action Press

Designed for the automotive trade, the No. 4L-7½-84-in. "Bliss" Lever Type Four Point Press, illustrated here, has as one of its features opposed motion rockshafts. The rockshafts, running from front to back, impart an opposed motion to the levers by means of eccentrics. This motion draws the slide up and then pushes it down for the working portion of the stroke. As a result, thrusts are equally distributed over the gibs under all loading conditions, and any tendency of the slide to

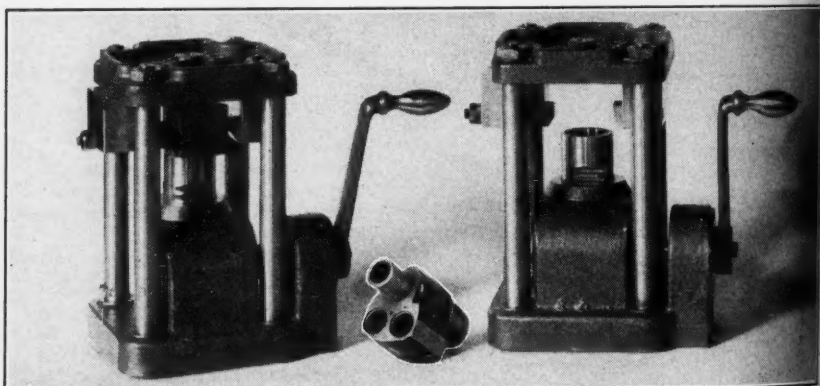
tilt while subject to unbalanced load is prevented.

This new four point press was developed by the E. W. Bliss Co., Toledo, Ohio, for blanking and shallow forming work. Another advantage of the design of this press is that the main outer links straddle the outer web of the crown, thereby eliminating any possible bending of the shaft and transmitting the load as a direct thrust through the web and making the press exceedingly sturdy and resistant to deflection.

Due to the linkage, a slight dwell at bottom stroke is obtained, which is very desirable in connection with drawing work. The dwell allows the metal to "set" when the punch is at the bottom of the die.

The press has a capacity of 250 tons at bottom stroke and comes under the four point, single action, classification. All gearing is inside the crown, resulting in straight, clean-cut lines. Electrically controlled by push buttons for inching and running, the press operates at a speed of 15 strokes per minute. The clutch is of the latest improved multiple disc pneumatic type, incorporating both clutch and brake in one unit. The drive is by V-belts.

The press has a 16-in. stroke, 20-in.



THE INJECTOR

Which is the heart of a Diesel Motor is now being drilled in Siewek 4-Post Drill Jigs. This job is in a large Diesel Motor plant in Detroit. Send for catalog No. 4 showing other styles and sizes.

THE SIEWEK TOOL COMPANY
FERNDAL, MICHIGAN

How to run a train across the country on \$100 worth of fuel

Problem: In spite of tremendous advances in passenger transportation, the railroads were not satisfied. They wanted faster schedules and still lower operating costs.

Answer: Lightweight streamliners! Glistening trains that speed across the continent in 56 hours at a low fuel cost undreamed of a few years ago. This progress has been made possible largely by a new type of Diesel engine of phenomenal efficiency. And contributing importantly to this success are modern abrasives made by Carborundum.

Without abrasives the vital fuel pump and injector parts could not be made accurate to fifty millionths of an inch. Without abrasives pistons, wrist pins, crankshafts and other parts could not be finished to limits which insure trouble-free operation for an almost unbelievable number of hours.

The Carborundum Company is justly proud of the part played by its abrasive products in the development of internal combustion motive power for the American railroads.

AN INVITATION TO EXECUTIVES CONCERNED WITH MANUFACTURING

Whatever you make, there are two ways in which The Carborundum Company's Abrasive Service can help your company. Highly trained abrasive engineers are ready to help solve any special grinding or finishing problem that may confront you. Also, without obligation, they will study your present abrasive set-up, report on its efficiency and, wherever possible, indicate how production can be improved or savings effected. Write to The Carborundum Company, Niagara Falls, N. Y. and a representative will call.

CARBORUNDUM

THE CARBORUNDUM COMPANY**ABRASIVE****PRODUCTS**

FOR ACCURACY AND ECONOMY IN MANUFACTURE

ed is
level-
oledo,
ming
esign
outer
the
estible
tting
n the
ingly
ell at
very
wing
al to
ttom
tome
the
tion.
liting
ically
ching
at s
The
tiple
both
drive
10-in.
ill
log
938

adjustment of the slide by a reversible electric motor, 48-in. diespace, stroke down, adjustment up, and the bed area is 50 in. front to back by 84 in. right to left. The extremely long adjustment permits the use of high or low dies at will.

Incorporated in the bed is a self-contained, externally guided "Marquette" pneumatic cushion which will give 22.6 tons blankholding pressure from air line pressure to 100 lbs. per square inch.



Ideal for use on auto bodies; blowers, fan and air conditioning equipment; conveying equipment; railway coaches; signs, machines and tools, agricultural implements, etc. Cut can be started in center of sheet without starting hole. No further finishing required. The metal is sheared, not punched. Easily operated.

There's a Libert distributor in your territory—or write for complete information.

LIBERT MACHINE CO.
GREEN BAY, WIS.

Manufacturers of shears since 1915

Libert Hi-Speed SHEAR

Cullman Sprockets

for

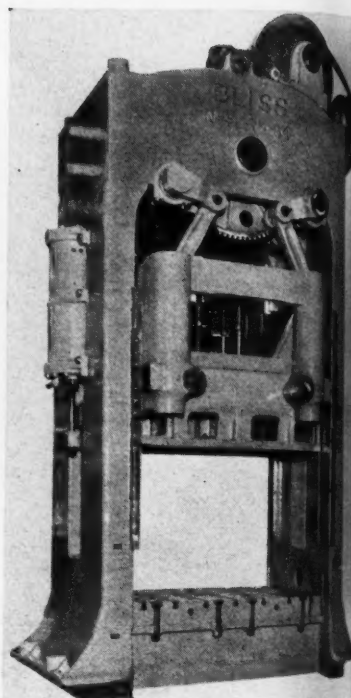
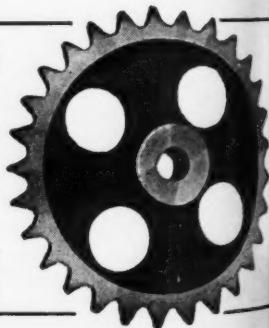
Roller, Block and Silent Chains
OVER 45,000 IN STOCK

Send for Catalog

Cullman Wheel Company

1336 ALTGELD ST.

CHICAGO



Bliss 4L-7½-84-In. Four-Point Single Action Press

The bed of the press is partially concealed in the pit. The counterbalancing cylinders, which compensate for the weight of the slide, are mounted in the uprights, thereby keeping the clean lines of the press.

No matter where you are—



there's a Union Drawn Distributor Nearby

Whether your plant is in a large metropolitan city or in a small town makes little difference when you need dependable cold finished steels or shafting in a hurry. In either case—in all cases—there is a Union Drawn Distributor within a few hour's hauling distance.

More than a hundred distributors—selected for their progressiveness—located in all important centers—carry large classified stocks of Union Cold Finished Steels and Shafting.

Your nearby Union Drawn Distributor is ready to ship your needs on a moment's notice. He can supply bars cut to the exact lengths you require. And, through his experience he can help you by recommending the best steel for the job and the most satisfactory method of processing.



UNION COLD DRAWN STEELS

MARKING

FLAT—ROUND IRREGULAR SURFACES BY ROLLING OPERATION



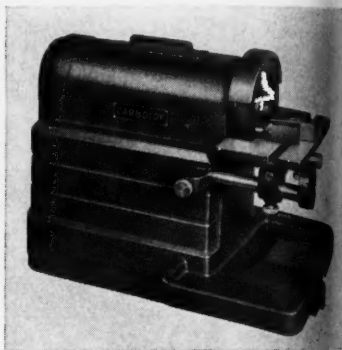
**MODEL 25
HI-DUTY MARKING MACHINE**

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
1806 BELLE PLAINE AVE.
CHICAGO, ILL.

Carboloy Tool Grinder

Carboloy Company, Inc., 2975 E. Jefferson Ave., Detroit, Mich., announces an inexpensive bench type tool grinder especially designed for the safe, rapid, economical sharpening of cemented carbide tools in sizes up to 1 in. square or equal cross section, on diamond wheels and lapping discs. The grinder contains all the features necessary to duplicate the performance of new tools at every sharpening. Small plants using cemented carbide tools will benefit



Carboloy Tool Grinder

sharpening tools in their own shop and large production departments will eliminate much of the time required in taking tools to the central grinding department by placing grinders nearer the machines.

One of the outstanding features of this machine is the quick setting graduated dial, with large graduations, that permits accurate angular adjustment of the table in order to maintain correct rake and clearance angles with keen cutting edges and smooth tool faces. Furthermore, wet grinding with diamond impregnated wheels, as performed on this machine, permits faster, more accurate sharpening, resulting in exceptionally long tool life. The large adjustable tool rest table is mounted across the face of the wheel with a stop provided for a tool guide protruding making it possible to grind angles of the tool without checking by hand protractor. The distance from the wheel to the tool rest is adjustable, offering maximum support to the tool while sharpening. Forward and reverse rotation of the wheel, facilitating the grinding of both right and left hand tools, is controlled by a switch located at the

TOP
ends
terial
to pr
finish—
broach
Detroit
plete a
chute
mounte
are ad
duction
per hou

LOWER
automot
tion fi
Broach
entire
oil seal
compound
pieces a

DE
600

Septembe

These BROACHING OPERATIONS



May Be In No Way Related to YOUR PRODUCTION PROBLEMS

... but they're convincing evidence that the Detroit Broach Company can and does design and produce broaches and broaching fixtures that meet innumerable production requirements. The above illustrations show typical broaches and fixtures designed and manufactured by this company for both high production work and comparatively low production but unusually complicated broaching operations.

When you're thinking of broaches or other broaching equipment to solve any of your particular manufacturing problems, it will pay you to consult the Detroit Broach engineers. They are experienced in handling all types of jobs "from scratch"—and producing the results that mean greater production economy for you.

Your Inquiry Will Receive Prompt Attention

TOP ILLUSTRATION: Broaching ends of magnetic coil core. Material is magnetic iron. Necessary to produce extremely high surface finish—free from any burrs after broaching. Fixture manufactured by Detroit Broach Company handles complete automatic cycle from loading in chute to final ejection. Broaches are mounted on removable sub-holders and are adjustable by taper wedges. Production — approximately 3300 pieces per hour.

LOWER ILLUSTRATION: Broaching automobile bearing caps. Three station fixture manufactured by Detroit Broach Company. Two stations broach entire contour. Third station broaches oil seal step. As two stations are of compound design, four entirely different pieces are broached in each cycle.

DETROIT BROACH COMPANY

6000 Beniteau Ave. • Detroit, Michigan

front of the machine under the drip pan. The 1½ in. heavy duty heat-treated alloy steel spindle runs on selected commercial ball bearings having heavy load-carrying capacity. Double row bearing with labyrinth seal at wheel end and single row plate-sealed at pulley end assure long trouble-free life with minimum end play in spindle.

The driving mechanism is accessible for easy oiling and for quick belt adjustment. Standard 6-in. plain cup or straight diamond wheels or special cup diamond wheels coated on face and periphery can be used on the grinder. Cast iron lapping discs can also be used.

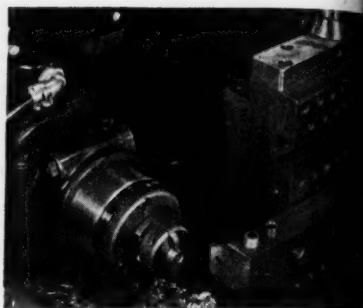
Overall dimensions of the grinder are: 14¾ in. high, 13½ in. wide and 20¾ in. deep. Uncrated weight, 135 lbs. Standard electrical equipment includes ¼ h.p. reversible motor, 110 volt, 60 cycle, single phase, 1725 r.p.m., and reversing switch.

Ex-Cell-O Universal Fixture

To facilitate the use of precision boring in shops where low production runs on a variety of parts are the order of the day, Ex-Cell-O Corporation, 1206 Oakman Blvd., Detroit, Mich., has developed a Universal Fixture for precision

boring and facing machines.

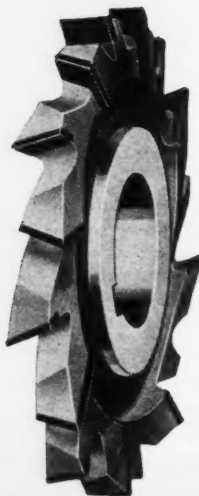
The fixture is provided with T-slots and a number of rows of staggered half-inch tapped holes and



Ex-Cell-O Universal Fixture Set Up for Facing and Chamfering Airplane Engine Valve Key.

apart. The fixture may be used for quick mounting of either the work, tool bar, or sub-fixture. Thus, the part may be mounted on the fixture and the boring tool on the spindle or the part can be held in the spindle and bored

CARBIDE TOOLS *tipped by Midwest*



WHEN YOU order Cemented Carbide Tools from Midwest you can be sure of three long-life advantages—

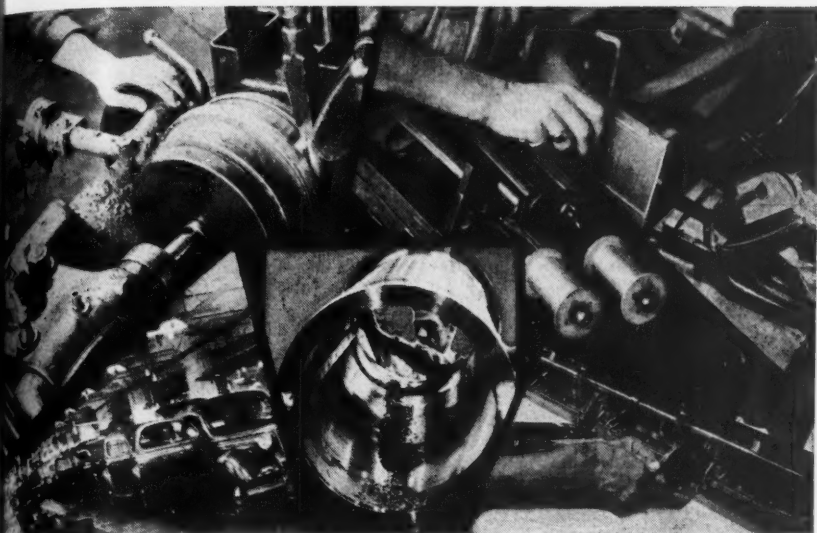
**Correct Design
Proper Grade of Carbide for Your Job
Expert Brazing and Finishing**

To insure these advantages is the skill of Midwest operators who had 8 years experience in fabricating cemented carbide tools, complete and modern brazing and grinding equipment.

Midwest Cemented Carbide Service includes supplying tips of cobalt, Firthite, or Vascoloy-Ramet tips and a wide variety of standard and special tools tipped with specified grades of these carbides.

Bring your cemented carbide problems to Midwest. For your convenience file send for Midwest's 32-page Bulletin on Cemented Carbide.

MIDWEST TOOL & MFG. CO.
2360 W. Jefferson Ave. Detroit, Mich.



INDUSTRY LEADS THE WAY...

...to a better standard of Seeing

Human eyes are industry's most critical control devices. For this reason, if for no other, their well-being is a matter of vital concern. Indeed, Americans can look forward with envy to the day when their homes, their schools, and their public buildings are all as well-lighted as the modern industrial working-place.

This fact will bring scant comfort to those who search for evidence that the so-called "selfish interest" of industry and the personal welfare of industrial workers are bound to be in conflict. For, clearly, the achievement of a sight-saving standard of seeing extends beyond mere "productive efficiency" to protect human welfare both while on the job and also after the day's work is done.

Good lighting conquers visual strain, it makes work easier, makes surroundings cheerier, and ends the nervous

tension that comes from eye-fatigue. At the end of a shift in the well-lighted plant, employees leave their work clear-eyed, visually fit for hours of recreation and home life.

In this trend to a better standard of seeing in industry, the General Electric Vapor Lamp Company has played a highly significant part. For General Electric mercury lighting, engineered by lighting specialists to the seeing tasks involved, has made it possible to provide sight-saving lighting at a cost well justified in industrial gains alone. Thus, motives of "good business" and human well-being are merged at a single goal—a clear-cut example of the fact that the profit-system points the way to a brighter future for America. General Electric Vapor Lamp Company, 897 Adams Street, Hoboken, New Jersey.

GENERAL  ELECTRIC
VAPOR LAMP COMPANY

INC.

or facing tool clamped to the fixture.

The upper part of the fixture may be mounted on the cross slide either at right angles or parallel to the spindle, alignment keys being provided for this purpose. An Ex-Cell-O precision ground lead screw is provided for the cross slide.

The fixture, while designed primarily for manual operation, may be obtained equipped with an hydraulic cylinder to control transverse fixture movement for installations where higher production quantities per hour are desired in regular operation.

The accompanying illustration shows the fixture being used in a set-up for facing and inside chamfering of an airplane engine valve key. The tool bar is mounted on the fixture and the part is held in the spindle in a simple centrifugal chuck having two fingers which engage the tapered diameter of the part as the spindle rotates.

Sundstrand Oil Power Variable Speed Transmission

The Sundstrand Machine Tool Co., Rockford, Ill., announces a new line of Oil Power Variable Speed Transmissions. The unit has an extremely wide speed



Sundstrand Oil Power Variable Speed Transmission

range, develops high torque with smooth operation at slow speeds as well as higher speeds, and provides high mechanical efficiency throughout the entire speed range.

Another feature is instant reversal of high speeds on continuous duty, which greatly increases the range of applications for hydraulic transmissions in both the industrial and machine tool fields.



PROCUNIER HIGH SPEED TAPPING HEADS

for TROUBLE-FREE

TAPPING

PROCUNIER builds the kind of tapping heads that give you the utmost in production, accuracy and service. PROCUNIER heads make you forget all your tapping troubles. Only PROCUNIER has all these big features:

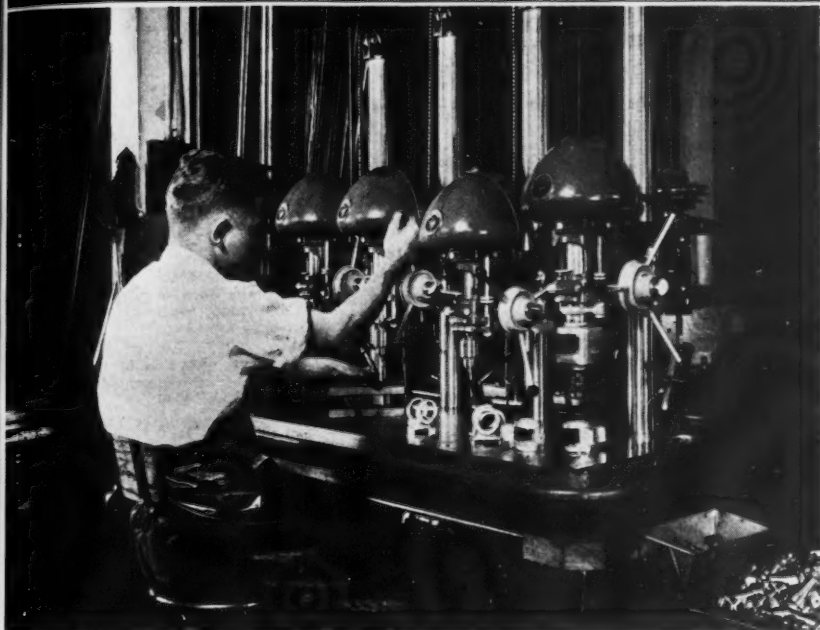
Dry, double-cone friction clutch that won't wear out and can't absorb oil TRU-GRIP Tap Holder, the most practical Tap Holder that ever held a tap, smaller, lighter, more accurate Ball Bearings Balanced heat treated planetary type reversing mechanism greatly reduces strain Write for literature.

PROCUNIER SAFETY CHUCK CO.

12 SOUTH CLINTON ST.

CHICAGO, ILL.

HOW INDUSTRY SAVES BY USING LIGHT POWER TOOLS



Low first cost, economical operation and low maintenance cost are some of the reasons for the rapid adoption of light power tools by industry.

Delta tools, for instance, are produced under modern production conditions like the modern automobiles. This means they cost less for the same production value than heavier tools that are made up either in small lots or on special order.

While no claim is made that light tools can or will replace heavier machines on many classes of work, there are many operations in which the lighter tools will not only perform as well as heavier, more expensive machinery, but will actually out-perform and

out-wear the heavier machines, due to more modern design, the use of self-sealed ball bearings, etc.

Delta low-cost drill presses require less power to operate. Replacement parts cost less. Their upkeep cost is remarkably low. They are flexible, and can be used in special set ups and in numerous combinations. They are portable and can be used for auxiliary operations. They occupy less space. Above all, they have PROVEN all these advantages to thousands of this country's leading manufacturers.

Find out how you can cut your cost with Delta tools. Write for latest 1935 Delta Catalog, and name of nearest Delta dealer.

DELTA Manufacturing Co.

659 E. Vienna Ave.,
Milwaukee, Wis.

September, 1938

MODERN MACHINE SHOP 127

Thank You ... readers for your generous praise

Here are a few typical comments received from MODERN MACHINE SHOP readers in the Cherry Card Survey now being conducted.

"It is a wonderful magazine full of information. I get a lot of good out of it."

A. H. Segler, Superintendent
Goodman Mfg. Co.
Chicago, Ill.

"Good—keep it up."

C. H. Sass, Mech. Superintendent
Simplex Wire & Cable Co.
Cambridge, Mass.

"We find a lot of equipment from this magazine."

L. Peters, Ass't. Superintendent
Harley & Davidson Motor Co.
Milwaukee, Wis.

"Very interesting and helpful."

J. B. Randolph, Pres.
The Ohio Knife Co.
Cincinnati, Ohio

"Very good magazine and very helpful."

A. H. Anderson, Tool Room Foreman
General Fireproofing Co.
Youngstown, Ohio

"Most complete little book I've ever seen."

Harry Weiner, Gen. Mgr.
General Slicing Machine Co.
Brooklyn, N. Y.

"I find the articles in your publication very interesting and your advertising is very complete."

C. W. Miller, Chief Inspector
Westinghouse Electric, Nuttall Works
Pittsburgh, Pa.

"This magazine is tops with me."

W. D. Vinson, Master Mechanic
Langdale Mill
Langdale, Alabama

"I take my copy home to read it."

W. H. Smila, Master Mechanic
Chrysler Corporation
Detroit, Mich.

"Best of its kind published."

T. A. Rogers, Supervisor
Seversky Aircraft Corp.
Farmingdale, L. I., N. Y.

"I consider 'MODERN MACHINE SHOP' a live, up-to-the-minute magazine."

E. E. Wood, Prod. Engr.
R. K. LeBlond Machine Tool Co.
Cincinnati, Ohio

MODERN MACHINE SHOP **in this magazine!!**

"This is the ideal source on manufacturing information for the busy executive."

J. R. Lynch, Chief Inspector
Coleman Lamp & Stove Co.
Wichita, Kansas

"We not only pass it around but keep a file of back issues for the men."

T. B. Jefferson, Engr. in Charge
U. S. Engineer Dept. Shops
Fort Peck, Mont.

"I like the magazine very much and appreciate receiving it."

G. H. Kennedy, Mech. Engineer
Sonaco Products Co.
Hartsville, S. C.

"We enjoy it very much and find it very useful."

C. M. Campbell, Master Mechanic
Wheeling Steel Corp.
Beech Bottom, W. Virginia

"I consider 'MODERN MACHINE SHOP' extremely valuable to executives and supervisors engaged in that class of operation."

W. R. Heald, Ass't. Supt.
E. I. du Pont de Nemours & Co.
Wilmington, Del.

"MODERN MACHINE SHOP is of exceptional value to the machine shop executive."

N. E. Gardner, Supt. Plant 2
Mack Manufacturing Co.
Allentown, Pa.

"A very interesting Periodical. We not only like the contents, but also the size as it is easy to carry along in order to read at an opportune time."

Vincent Bach, Pres.
Vincent Bach Corp.
New York, N. Y.

Readers--Note!!

**If you have not already filled
in and returned the cherry
colored card attached to your
copy of MODERN MACHINE
SHOP do so AT ONCE!!**

Operating temperatures are low for either continuous or intermittent duty.

The transmission is housed in a small compact case and consists of a variable displacement multiple piston type pump, a fluid motor also of the multiple piston type which may be of either variable or constant displacement, and an unusually simple control mechanism. The control may be either automatically or manually operated.

Illustrated is a Model 5HT Sundstrand Oil Power Hydraulic Transmission which is rated as a 5 h.p. unit. It provides a speed range from 3 to 2400 r.p.m. Additional sizes available are a 2 h.p. and a 10 h.p. unit with larger sizes to be added to the line in the near future.

Gisholt Taper Bolt Turner for Turret Lathes

A taper bolt turner that is designed to rapidly, accurately and simply turn locomotive frame taper bolts is announced by Gisholt Machine Company, Madison, Wisconsin. The turner is easily and quickly set up for machining taper bolts of different sizes, which makes it very useful for repair work as well as for straight production. It also turns straight diameters, permitting the

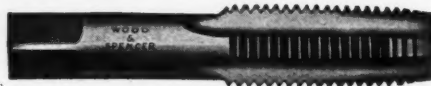
bolts to be finished completely in one setting. Bolts 2 in. in diameter by 12 in. long are machined complete in 15 minutes, floor to floor.

In practice, the large diameter of the bolt holes are gauged on the construction or repair floors with simple plug gauges and exact size bolts are then ordered from the turret lathe department. The standard bolts have a taper of .001 in. to the foot.

A set of 12 gauges lettered from A to L is required to cover the range from 1 to 2½ in. These gauges have a taper of 1/8 in. per foot, which is twice the taper in the locomotive frame bolt holes and will, therefore, contact and measure only the large diameter of the holes. Each gauge covers 1/8 in. of diameter and is graduated in ten equal numbered spaces which represents 0.0125 in. difference in diameter. These numbered spaces are further graduated into four equal spaces which represent approximately 0.003 in. difference in diameter, permitting the gauges to be quickly and easily read. A chart is furnished from which the gauge readings may be easily interpolated to diameter readings for setting the turner.

The procedure to follow in cutting a taper bolt is as follows: The cutting

WOOD & SPENCER TAPS



PROMPT DELIVERY and SERVICE

STANDARD-SPECIAL-CUT or GROUND THREAD

CARBON or HIGH SPEED STEEL

THE WOOD & SPENCER CO. 1910 E. 61st St. CLEVELAND, O.

ROSS

Air Control

VALVES

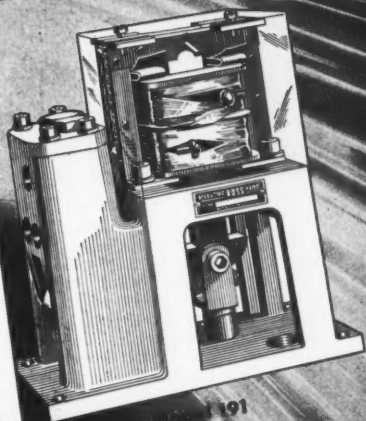
for High Speed WELDING SERVICE

THESE two new air valves are designed for operation at high speeds. Model 165T for single acting and Model 191 for control of double acting cylinders. Compactly built and light in weight, yet extremely rugged to withstand severe service over prolonged periods of use. Poppet type, pressure seated, assures perfect seal. Line pressure utilized to reverse valve action. Eliminates return springs and permits the use of smaller solenoids. All working parts are readily accessible, with valve or solenoid removable by just loosening four bolts. Made only in $\frac{3}{4}$ " pipe size. Furnished in all the standard current characteristics. A size and type of valve for your air actuated equipment.

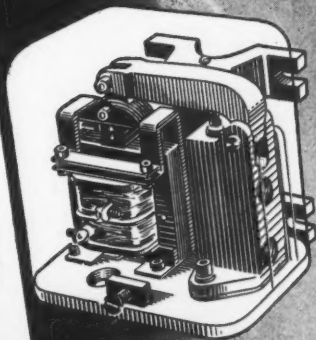
Send for Catalog No. 38

ROSS OPERATING VALVE COMPANY

6484 Epworth Boulevard
DETROIT • MICHIGAN



Model 191



Model 165 T



BRIDLE FOR
HORSEPOWER

must be set exactly on center which is easily done by measuring $2\frac{1}{2}$ in. from the plainly marked ledge on the tool block to the tip of the cutter. The turner is set for a 2-in. size bolt by means of a master plug gauge inserted in the center hole. This gauge is 1.9375 in. dia., which is the diameter of

tion Turret Lathes by merely changing the back plate for mounting on the turret face. A guide bar with tapered guide cam which actuates the roller and cutter is fastened to the headstock and slides in the angle way on the turner. The guide bar is arranged so that it can be swung out of the way

when not in use, thus clearing the way for other operations. It is not necessary to back the turner off the guide bar, as it will lift out of the turner at any position. This is an advantage in the case of short bolts.

In operation, as the carriage feeds forward, the cam depresses the roller follower which rotates a quill inside the turner moving the tool slide and roller slides outward at a uniform rate. The rollers follow immediately behind the tool, rolling on the finished taper surface. This burnishes the work to a high finish.

All moving parts are made of hardened steel with the screws and bearings mounted on ball

bearings.

The standard taper bolt turner will cut a taper having a maximum diameter of $2\frac{1}{2}$ in. and a minimum diameter of $5/8$ in. with a length of about 14 in. The standard taper furnished is $1/16$ in. per foot. Different tapers may be secured on special order.

LeBlond No. 3 Cutter Grinder

A newly designed cutter grinder, incorporating greater precision, efficiency and convenience features, has been introduced to the trade by R. K. LeBlond



Gisholt Taper Bolt Turner for Turret Lathes

a 2-in. bolt 12 inches from the head and having $1/16$ in. taper per foot. To turn other size bolts, the hand wheel is turned a number of graduations corresponding to the difference between 2 in. and the diameter to be turned. For example: For a bolt 1.950 large diameter the handwheel will be turned (2 in.—1.950—.050) or 50 graduations. The pointer on the guide bar should be set to 12 in. and the clutch engaged. When the clutch is disengaged the turner will turn straight.

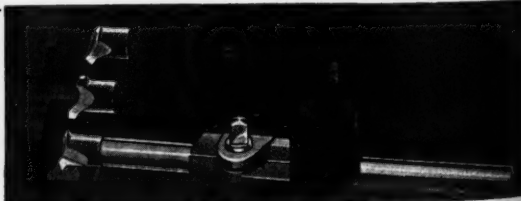
The Gisholt taper bolt turner will fit on either Gisholt 1L or 2L High Produc-

"COMET" Internal Boring and Threading Tools

Use ready-made tools for
ECONOMY AND
SERVICE

For holes from $1/16$ " up.
15 different sizes.
Easily resharpened.
Angles always maintained.

Write for complete data.



Time Saving . . Increased Production . . Greater Accuracy

COMET TOOLS INC.

39 Union Square
NEW YORK



(Full size)

NEW LUFKIN

UNIVERSAL INDICATOR MAKES NEWS

Being new and making news at the same time calls for the extraordinary. And so it's no surprise that the new Lufkin Universal Indicator is making news everywhere. It's a new tool with many new features. It's truly an extraordinary tool.

TWO READING FACES • With a reading face on the end as well as the side, readings can be easily taken no matter in what position the tool is set.

ROTATING HEAD • The Indicator Head rotates both horizontally and vertically, and because of the double reading face is made in one piece. This construction reduces wear.

POSITIVE LOCK • The clamping device is a nut, spring and washer, held together as one unit. During set-up and previous to tightening, it frictionally holds the Indicator in position.

WRITE FOR CATALOG NO. 7.

NEW YORK
106 Lafayette St.

THE LUFKIN RULE CO.
SAGINAW, MICHIGAN

Canadian Factory
WINDSOR, ONT.



This Unusual **RIGID** Alloy Tool-Steel Wheel-Blade Gives You

● **Faster**

● **Lower Cost**

● **Pipe Cutting**

Your skill at mechanics makes it easy for you to see why this **RIGID** Cutter with its new style wheel-blade can cut pipe more quickly and cleanly and last far longer, giving you extra economy.

For the **RIGID** knife-like blade is coined out of fine tool steel, hammered, heat-treated and then assembled in the hub. That's what gives it the unusual stamina for hundreds of extra cuts, reducing your cutter wheel expense, as thousands of users have found.



Powerful housing, guaranteed warp-proof, always cuts true, twirls easily to your pipe size. You like the "feel" of this tool, enjoy working with it.

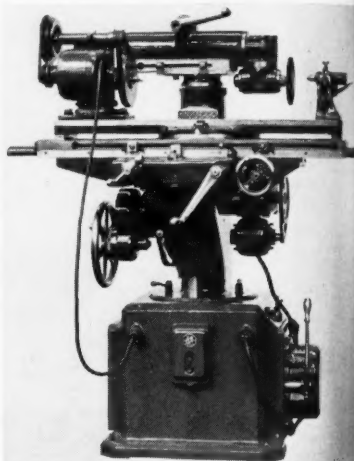
For time and expense saving and a tool you get a "kick" out of owning and using, buy the **RIGID** Cutter — at your Supply House.

**THE RIDGE TOOL CO.
ELYRIA, OHIO**

RIGID PIPE TOOLS

Machine Tool Company, Cincinnati, Ohio. The new No. 3 Cutter Grinder is designed to deliver faster sharpening and grinding with a new operating efficiency and a new capacity for work.

Seven distinct new features have been built into the LeBlond cutter grinder that make for faster cutting and grinding: (1) Universal Wheel Head: with three independent and co-ordinated planes of full circle movement achieves a new versatility and flexibility. (2)



LeBlond No. 3 Cutter Grinder

Variable Speed Transmission: A smooth, vibrationless drive delivers the proper cutting speed for any grinder wheel. (3) Selective Speeds to Spindle: Four speeds—3100, 4000, 5100 and 650 r.p.m.—provide proper latitude for every work requirement. (4) Universal Table Position: Patented construction of the table makes possible the placing of the work to the grinder wheel in any position or angle. (5) Operation of Feeds: By means of advanced designing and engineering, feeds are operated smoothly, precisely and quickly. (6) The Wheel Head: Independently motored with a variable speed driving unit. (7) Long Life Construction: Characteristic LeBlond construction has been carefully carried out in the No. 3 for long life under rigorous use.

Bulletin describing the new No. 3 LeBlond Universal Cutter and Tool Grinder, complete with illustrations and construction details and specifications, may be obtained by writing the R. K. LeBlond

Look for this
mark on the
tang of a File

American Swiss Files of Precision

Swiss Pattern File



Made in the United States
BUY FROM OUR DISTRIBUTORS

Wherever accurate and precise results are of the utmost importance, the use of American Swiss Pattern Files of Precision will prove their value every time.

At no higher cost than other makes of Swiss Pattern Files, the American Swiss Pattern File of Precision will show a saving in time and filing cost.

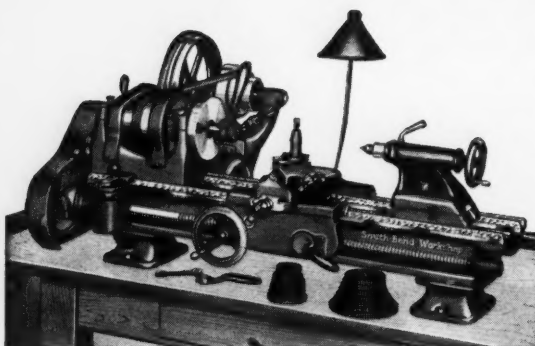
RIFFLER FILE



AMERICAN SWISS PATTERN FILES

AMERICAN SWISS FILE & TOOL CO., ELIZABETH, N. J.

Also manufacturers of Mechanics' Hand Tools and Knurls



South Bend 12-Speed 9-In. Precision Bench Lathe

Blond Machine Tool Company at the above address.

South Bend 12-Speed 9-In. Swing Precision Bench Lathe

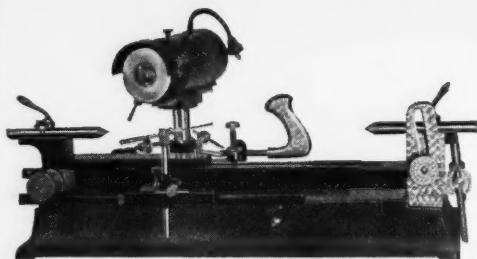
A 12-speed 9-in. Swing Precision Bench Lathe has been announced by the South Bend Lathe Works, South Bend, Ind. The new back-geared metal work-

ing lathe provides spindle speeds ranging from 40 to 1200 r.p.m., cuts screw threads from 4 to 112 per inch, and has power longitudinal turning feeds of 0.002 to 0.015 in. A hardened and ground alloy steel headstock spindle with ball thrust bearing is standard equipment with the lathe for precision machining at high speeds. The lathe has a 1/3 h.p. motor and adjustable horizontal countershafts with two-step pulleys for motor and countershaft to provide the range of speeds.

The 12-speed lathe is especially recommended for machining very small diameter parts of steel, cast iron, brass, aluminum and so on, with maximum accuracy and precision.

Other features of the lathe are: two gear reverse for right and left hand screw threads; a heavily designed saddle with adjustable gibs on the cross feed and compound rest; a precision lead screw guaranteed to meet the most exacting requirements for cutting accurate screw threads on master taps, precision thread gages and so on; a

... You've waited years for this NEW "Time-Saver" Tool Grinder



Sharpens all types of Cutters, Reamers, Taps, End Mills, Hobs, etc.

Sharpens BETTER BY grinding the relief straight from the cutting edge.

Much faster and easier to set up and operate than heavy production grinders and does as good or better work.

Low in cost—any shop having tools to sharpen can afford a "Time-Saver". Increases service from tools 3 to 5 times. Compact—fits into any out-of-the-way space in shop or tool room.

*Write for prices
and complete
information.*

PRECISION ENGINEERING & MFG. CO.

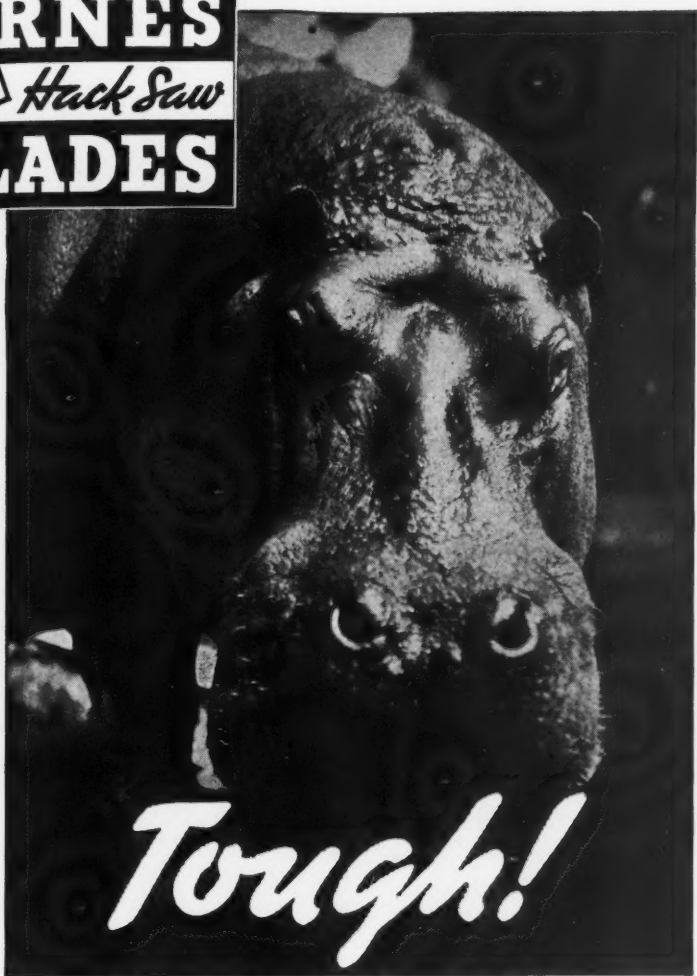
NEW PHILADELPHIA

OHIO

spindle
from 40
new thread
inch, and
inal time
o 0.015 in.
und 1/2 in.
ck spindle
bearing
with
machining
lathe
and adjust
interchange
ys for mo
tt to pro
ceeds.
e is espe
for ma
diameter
ron, brass
timum as
are: two
left hand
ed saddle
cross feed
sion feed
most ac
ing acco
ter taps
o on; all

BARNES

BETTER *Hack Saw*
BLADES



Tough!

Barnes "Service" Blades are as tough as a Hippo's hide. Made from special steel, they resist wear, won't break or strip their teeth. Especially recommended for heavy production schedules.

REMEMBER—there are six types of Barnes Blades—one for every metal cutting need.

Buy through your distributor.

Don't overlook our exhibit at the National Metal Congress and Exposition, Detroit, Oct. 17-21. We'll be on hand to greet you at Booth No. C-524.

W. O. Barnes Co., Inc., Detroit, Michigan

gears cut from steel blanks and hand-scraped V-ways on lathe bed. The lathe takes 38 attachments for a variety of jobs, including grinding, draw-in collet chuck work, milling, and so on.

Write Technical Service Dept., South Bend Lathe Works, South Bend, Ind., for Catalog No. 46-A.

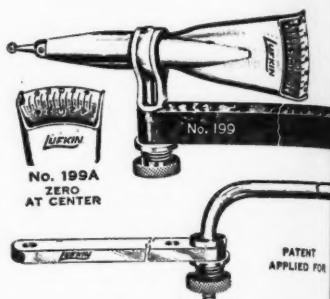
Lufkin No. 199 Universal Indicator

To its line of precision tools The Lufkin Rule Co., Saginaw, Mich., has added Universal Indicator No. 199 which has a rotating head, positive lock, and two reading faces. It can be used and read in any practical position.

One of the unique and valuable features of the No. 199 is the location of the reading faces. As illustrated, one face is on the front or flat side and the other on the end or top, making the indicator especially suitable for jig boring, milling machine and drill press work. In such work, the end graduation makes possible reading without a mirror. Also, when used with a surface gage and vernier height gage, end reading is convenient.

The indicator, which is a single unit, makes a complete revolution on its own

center and also on the clamping bolt. This forms practically a universal joint, all locked in position by one thumb screw. The frictionally-held contact point can



Lufkin No. 199 Universal Indicator

be set at any position in a half circle.

A standard bar for general use and special attachment for use in a chuck or surface gage and with vernier height gage are furnished with each indicator. The clamping device frictionally holds the indicator in position during

Sheldon

No. 1020 BMW LATHE

A PRECISION \$185

Screw Cutting Lathe for



1 1/8" hole in Spindle—3/4" Round Collet Capacity.

If you are really looking for "more lathe for the money", for a weight, full size, quality machine tool, built in every detail to meet standards, you will find it in the Sheldon No. 1020 BMW. This Geared, Screw Cutting 10 1/4" swing, 20" center distance Precision Lathe with hardened and ground spindle, phosphor bronze special bearings, cone, single back small face plate, stock motor drive, feed with semi-chang box, and dial.

pound net weight, post, and necessary wrenches complete as illustrated, with motor only \$15.00 F.O.B. Chicago. Write for Catalog and nearest dealer.

Machine Tool Dealers—

The Sheldon Lathe line provides Bench, Floor and Pedestal Types of Lathes up to 11 1/4" swing, with a wide choice of drives and all standard attachments. Make it a rule to "See the Sheldon before you buy."

SHELDON MACHINE CO.
 3259 S. COTTAGE GROVE AVE.
 CHICAGO, ILL., U. S. A.

TIME EATING JOBS BEATEN BY A HEAD!

The BRIDGEPORT HEAD mills, drills and bores **at all angles** without changing the setup of the work.

If you're looking for a precision tool that will lick those tricky, time eating jobs — investigate the high speed BRIDGEPORT "Master" Milling, Drilling and Boring Head.

It serves the one man tool shop or the largest automotive, electrical and machine tool industries with equal satisfaction.

Beat those tough jobs by a head — a BRIDGEPORT Head.

*Write for
complete
literature.*



BRIDGEPORT PATTERN & MODEL WORKS
52 REMER ST. **BRIDGEPORT, CONN.**

the set-up. It consists of a nut, spring and washer, held together as one unit.

The housing is of tough, rust-proof metal. The contact point and all working parts are hardened. The No. 199 has zero at the extreme left, and reads left to right. No. 199A has zero at the center and reads to the left and to the right. A plush-lined case with spring-hinged cover can be supplied.

Stevens Metal Spray Gun

A two-speed gear shift which makes possible the use of both hard and soft



Stevens Two-Gear Shift Metal Spray Gun

LICK VIBRATION

WITH



The Nut that can't shake loose

Here's one nut that stays tight . . . when backing off tendency occurs the built-in locking ring springs to life and grips the bolt. Self-contained. Easy to remove with wrench . . . can be re-used . . . does not harm bolt threads. Write for literature.

Patd.
and
Pats.
Pending



Fig.
1510

Cutout Section Showing
Locking Ring in Place.

STANDARD

PRESSED STEEL CO.

BOX 556

JENKINTOWN, PA.

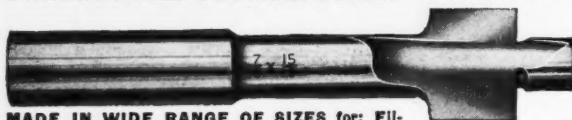
BRANCHES

Boston, Detroit, Indianapolis, Chicago,
St. Louis, San Francisco

metals without complicated adjustments is said to be an exclusive feature of the Stevens Metal Spray Gun, manufactured by Stevens Metal Spraying, Inc., Shipley St., San Francisco, Cal. The mechanism of the Stevens gun is synchronized so that the feed is automatic.

The Stevens gun has a capacity of lbs. of aluminum, 10 lbs. of steel, lbs. of copper, or 30 lbs. of zinc per hour. With a spray gun of this type tanks, vats, girders and similar large parts or units can be coated against corrosion. Guns of this type are used for coating food machinery, coils and tanks with tin, lining pipes with lead and copper, and for similar uses.

THREADWELL COUNTERBORES for Fast Production and Long Life



MADE IN WIDE RANGE OF SIZES for: Flat Head, Hexagon Head & Flat Head Screws. Write for Circular.

THREADWELL TAP & DIE CO.

GREENFIELD

MASS.

The circular body between the cutters ensures a permanent pilot which outlasts the tool. Cuts smoothly—no chattering. Easily sharpened—no loss of two cutting lips with spiral flutes giving ample clearance, strength and speed.

There is

Latest Information on **ROTO-CLONE** DUST CONTROL

A dust control system to perform economically and efficiently must be carefully engineered and the components properly designed and correctly installed. To help manufacturers with process dust problems, we have issued this Bulletin on the Type D Roto-Clone. It contains complete engineering data and suggested specifications for the construction of branches and mains, piping connection, etc. If you have a dust problem this bulletin will be of inestimable value. Write today—for Bulletin 272.

American Air Filter Co., Inc.
Incorporated

Central Ave. Louisville, Ky.

In Canada: Darling Bros., Ltd.
Montreal, P. Q.

American Air Filter Co., Inc.
Central Ave., Louisville, Ky.

men:

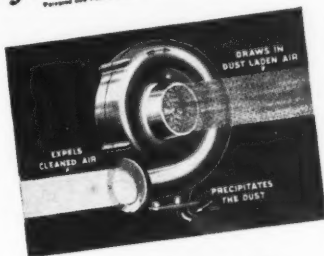
Please send me without obligation a copy of your Roto-Clone Bulletin.

Name _____
Address _____
City _____

State _____

ROTO-CLONE *Dynamic Precipitator*

Patented and Patent Pending in U. S. & 44 Foreign Countries



TYPE-D

ENGINEERING DATA



Combined Exhauster and Dust Separator

**SENT FREE
WITHOUT OBLIGATION
USE THE COUPON**



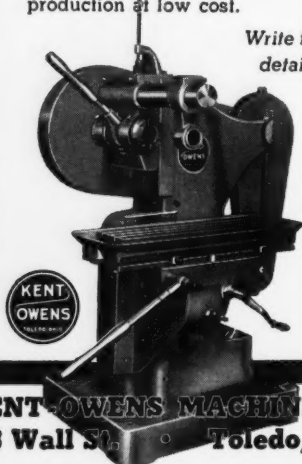
TRAINED

FOR POWER — SPEED — ACCURACY

Kent-Owens MILLERS

All the "beef" necessary for power—but no unnecessary and costly surplus—Kent-Owens Millers are like well trained heavy-weights. • They cost you less to own, because no money is wasted on useless metal, or gadgets which you don't need. • They are built for fast, accurate, production at low cost.

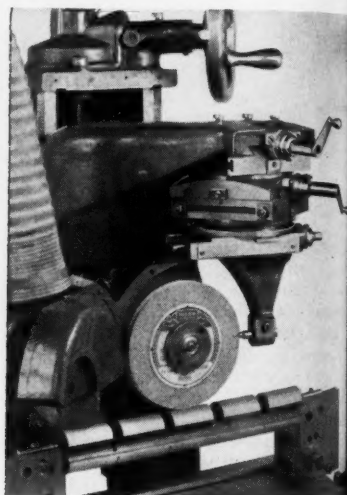
Write for
details.



KENT-OWENS MACHINE CO.
958 Wall St. Toledo, Ohio

U. S. Compound Wheel Truing Attachment

According to the manufacturer—U. S. Tool Company, Inc., Ampere, N. J.—The U. S. Compound Wheel Truing Attachment shown in this illustration is the only wheel dressing device designed for permanent mounting on the grinder spindle column. The attachment is brought into position for truing the grinding wheel quickly and easily without disturbing the work



U. S. Compound Wheel Truing Attachment

the grinder table. When not in use the device is entirely out of the way and does not interfere with the normal work of the grinder.

Any desired angular or radial form can be easily dressed on a wheel with the attachment. Combinations of radial and angular forms are blended with another to give a continuous form surface. The three adjustable slides on the unit permit truing of any shape within the scope of application is only limited by the ingenuity of the operator. Since all of the adjustments are furnished with scales, the settings used in obtaining any form may be recorded and the exact form duplicated at any future time.

Another important feature of the U. S. Compound Wheel Truing Attachment is the simplicity of adjusting the diamond to position with a gage.

el Truing

acturer-
ampere, B
Compos
own in
eel drea
at moun
an. The
position
quicky
he work



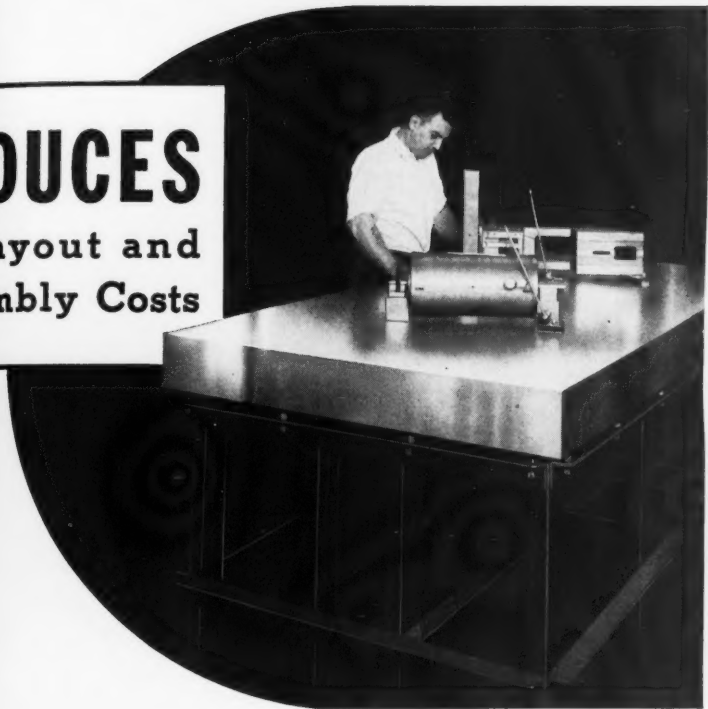
Attach
ot in
the w
he nor
dial fo
wheel
of rad
with
form
es on
shape
y lim
tor. S
furni
n oba
and
y fut

or the
tachm
the d

er, 193

REDUCES

Layout and Assembly Costs



CHALLENGE *Semi-Steel Surface Plates*

Absolutely level and rigid, this dependable surface plate promotes accurate, profitable work. It saves time . . . reduces waste and improves workmanship on every job. Challenge Semi-Steel Surface Plates are made of highest grade iron and steel, planed and finished all over. Will not dent or warp being reinforced underneath by heavy steel. Standard sizes: 12x18 to 48x96 inches. Special sizes to order. The arc-welded frame with 32 lock leveling screws is optional.

Write for prices
and full information today!

THE CHALLENGE MACHINERY COMPANY

CHICAGO
100 E. Hubbard Street

GRAND HAVEN, MICH.

NEW YORK
200 Hudson Street

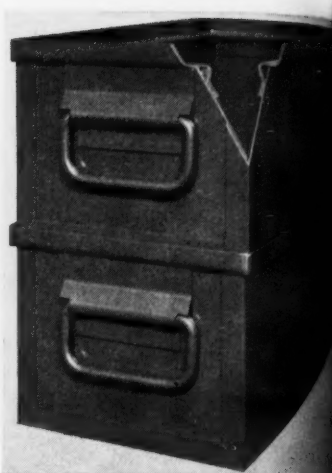
309

MODERN MACHINE SHOP 143

September, 1938

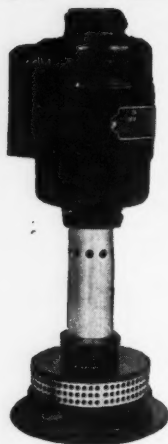
Stackbin Light-Weight Stacking Box

A stacking box in the design of which a one-piece welded stacking rim is combined with straight sides is said to offer strength, rigidity and freedom from torn corners. The box is a product of the Stackbin Corporation, 53 Troy St., Providence, R. I. As shown in the illustration, the stacking rim rests upon and is welded to the sides of the box, eliminating the weakness frequently found when the sides are bent to support the rim. Consequently, the sides



Stackbin Light-Weight Stacking Box

SAVE MONEY WITH THIS MIDGET PUMP



- Low purchase price.
- Low operating cost.
- Replaces larger, more expensive pumps on many jobs.

Write for full particulars.

NARRAGANSETT PRODUCTS CORP.

45 Baker Street

Providence, R. I.

can be made of light gauge steel at the price materially lowered without sacrifice in strength.

The rim is of 14-gauge steel, double thickness, formed in one piece and welded to make a solid rim which resists corner bending even under heavy loads and rough handling. This type construction is said to not only add to the durability of the box, but also to permanently end sharp, broken corners which can cause serious cuts to safety and hands. The safety feature is carried out in the perfectly clean, smooth exteriors and interiors. The box can be supplied in any size required.

Brown Compound Angle Vise

A compound angle vise which is said to have almost unlimited use in the

HINGES

VARIOUS WIDTHS
and GAUGES



BUTTS AND
CONTINUOUS LENGTHS

WRITE FOR PRICES

S & S MACHINE WORKS

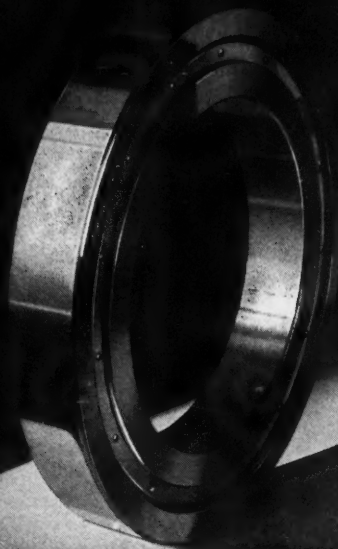
4541 W. LAKE STREET

HARDWARE DIVISION

CHICAGO, ILLINOIS

For
GUARDS
CABINETS
CASES
BOXES

BIG BALL BEARINGS



YES—UP TO 21- INCH BORE !

Rugged giants they are, in their ability to carry loads and stand up to punishing jobs. Yet they have all the PRECISION, the fineness, the friction-free smoothness, of their pigmy brothers in the NORMA-HOFFMANN line. ***

And, between the biggest and the smallest, a complete range of sizes is available—each marked by the family quality of PRECISION.*** There's a PRECISION Bearing (ball, roller or thrust) for every load, speed and duty.

Send for the Catalogue . . . Let our engineers work with you

NORMA-HOFFMANN
PRECISION BEARINGS
BALL, ROLLER AND THRUST

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U.S.A.

REDUCE YOUR DIE COSTS

with

HY-TEN
"M"
**TEMPER
ALLOY STEEL**

**.70 Carbon Cr-Ni-Moly
Oil Hardening.**

**Rounds, Squares, Flats for
Immediate Shipment.**

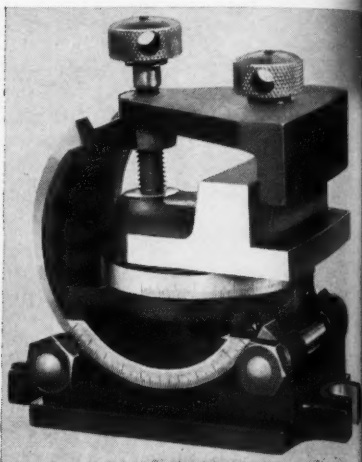


*Write for Free
Copy of Steel
Users' Data
Sheets.*

Wheelock, Lovejoy & Co., Inc.

130 Sidney St. Cambridge, Mass.
CLEVELAND CHICAGO NEWARK
DETROIT BUFFALO

and die shops and production plants now being marketed by The Brown Compound Angle Vise Company, 10465 Carnegie Ave., Cleveland, Ohio. The vise is so designed that it holds workpieces accurately and securely at any angle or combination of angles. The fact that there is no overhang assures unusual rigidity. An independent clamping arrangement prevents distortion of the base of the vise or changing the position of the work. Clamping



Brown Compound Angle Vise

a piece to be held is both simple and positive.

The parts of the vise which are subjected to strain are made of special steel alloys, hardened to reduce wear. Both of the dial graduations are of sufficiently large scale to permit easy reading and accurate setting. The easy adaptability of the vise to complicated set-ups for grinding and other light machining operations is said to frequently eliminate the necessity for special fixtures. On the other hand, for production purposes, such special holding fixtures can be readily used in place of the standard jaw.

The maximum jaw opening is $1\frac{1}{2}$ in. and the width of the jaw is $3\frac{1}{4}$ in. The base is $3\frac{1}{2}$ x 8 in. Weight, 14 pounds.

Black & Decker High Speed Portable Grinders

The Black & Decker Mfg. Co., Towson, Md., announces two high speed portable grinders with wheel size capacities

**INITIAL
SAVING
\$235**

**CONTINUAL
SAVING ...**

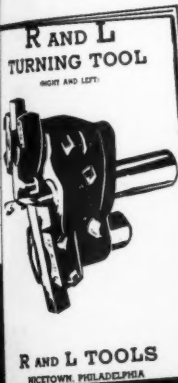
on production time
by performing sev-
eral operations
at once.

**INITIAL
SAVING \$235**

You pay \$300.00 for an assortment
of right and left hand tools . . . You
pay \$65.00 for one R & L Turning Tool that
will produce the same amount of work . . .
You save \$235.00!

CONTINUAL SAVING

Here are a few of the multiple operations
performed by the R & L Turning Tool:
Turns two diameters while drilling or
reaming - Turns and centers - Drills and
chamfers - Roughs and finishes
cuts, right or left hand.



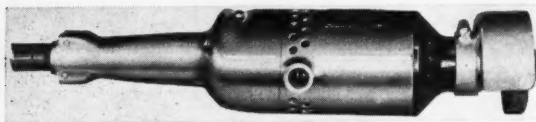
You'll want to know more about this money-saving
tool. New catalog gives illustrations, instructions
for use and prices. Drop us a line right now,
while you're thinking of it.

R & L TOOLS

1825 BRISTOL ST., NICETOWN, PHILADELPHIA, PA.

of 2 and 2½ in. The grinders are precision tools, having a no-load speed of 19,000 r.p.m., an overall length of 13½ in., and the very light weight of 3½ and 4½ lbs., respectively.

Having been designed for use where a



Black & Decker 2½-In. High Speed Portable Grinder

small size wheel is required, the grinders are said to be quite versatile in their general application. They are well balanced and, therefore, are particularly easy to handle where accuracy and fine grinding are necessary.

Reconditioning Service on Gage Blocks Extended

Cost of precision measurement for many industrial firms will be reduced materially through a new service of the Ford Motor Company, Johansson Division, Dearborn, Mich., which extends re-

conditioning operations on gage blocks of 2, 3 and 4-in. size.

Previously, reconditioning service has been available only for blocks of 5-in. size or larger. Under a secret process used by the Johansson Division, blocks which have become worn in service beyond their original accuracy can be renewed in most cases, thus virtually doubling their useful life at a cost considerably less than for new blocks. After such reconditioning blocks are returned to their owners guaranteed to within their original ac-

curacy.

The Johansson reconditioning service is combined with an inspection service by which gage block sets are accurately tested for size and possible "high spots." Blocks showing need of reconditioning can be serviced and returned to owner in about one week.

U. S. Model No. 2500 Portable Surface Grinder

The U. S. Electrical Tool Co., 2471 Sixth St., Cincinnati, Ohio, announces a portable surface grinder especially de-

"HALLOWELL" SHOP EQUIPMENT

Its steel construction gives it greater strength and longer wear... yet it keeps its price at present day levels.

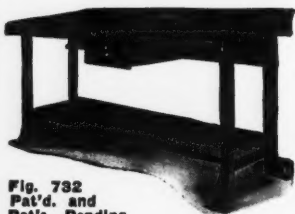


Fig. 732
Pat'd. and
Pat's. Pending
Drawer is extra

"HALLOWELL" WORK-BENCH

Popular everywhere is this bench because of its rigid steel construction, a top that stays smooth as a surface plate and its really low price. Over 1300 combinations make certain your needs can be met. Catalog?

"HALLOWELL" STEEL TOOL STANDS

Moves easily wherever it's needed; a handy stand to have. Made in a variety of types for all purposes.



Fig. 700

STANDARD PRESSED STEEL CO.

BRANCHES

BOSTON

DETROIT

INDIANAPOLIS

JENKINTOWN, PENNA.

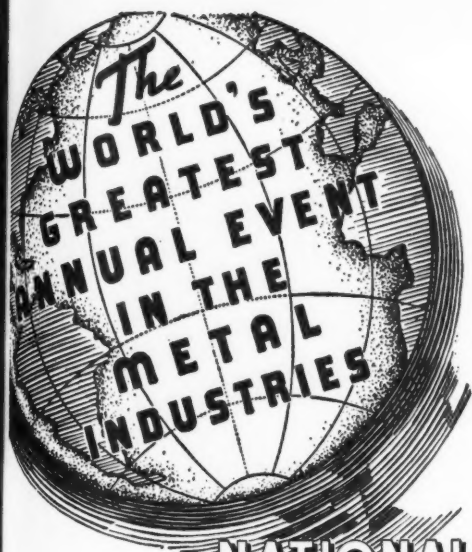
BOX 556

BRANCHES

CHICAGO

ST. LOUIS

SAN FRANCISCO



OCTOBER 17 - 21

EXPOSITION HALL

Under the auspices of American Society for
Metals, 7016 Euclid Ave., Cleveland, Ohio

DETROIT

NATIONAL METAL CONGRESS → → →

DECIDE NOW to join the thousands of metal men, members of five great technical societies, who will assemble in Detroit, between Oct. 17th and Oct. 21st, to bring themselves abreast of every latest development and new improvement in each phase of the Metal Industries. You will return to your desk inspired with new energy, new determination and new values to yourself and your company.

Co-operating to make the twentieth Annual National Metal Congress and Exposition surpass all previous meetings are: : American Society for Metals: : Wire Association: : Institute of Metals Division and Iron & Steel Division of A. I. M. M. E.: : American Welding Society.

NATIONAL METAL EXPOSITION

The WORLD'S GREATEST ANNUAL EVENT IN THE METAL INDUSTRIES

**CO-OPERATING
SOCIETIES**

**American Society
for Metals**

Wire Association

**Institute of Metals Division,
A. I. M. E.**

**Iron & Steel Division,
A. I. M. E.**

**American Welding
Society**





OCTOBER • 17 • 21

Tell everyone NOW that, between Oct. 17th and 21st, you will be in Detroit with other progressive metal men, attending National Metal Congress and Exposition. Tell them that "The World's greatest annual event in the Metal Industries" is going to be bigger, better and more helpful than ever before. Tell them that it's going to make you a more valuable man . . . to your company, your family and yourself . . . because it will bring you up to the minute on every latest development in your particular field of activity and new improvements saved for first introduction at the Congress and Exposition. Tell them that nothing can stop you from being present.

Auspices of American Society for Metals
7016 Euclid Avenue Cleveland, Ohio

NATIONAL METAL EXPOSITION

signed to take the place of old style, heavy, cumbersome, straight alternating current grinders. Known as the Model No. 2500, the grinder is built in two



U. S. Model No. 2500 Portable Surface Grinder

sizes—6-in., 1 h.p., and 8-in., 1½ h.p. The grinder is exceptionally high-powered and light in weight, the housing being built of aluminum. It is designed for continuous production service in foundries, railroad shops, body shops, machine shops, and so on, to be used for grinding, buffing, polishing, sanding down castings, and numerous other operations.

The motor is furnished in 220 volt, 50 or 60 cycle, three-phase alternating current only and can be used on 440 volts with a portable dry transformer. The air cleaner keeps dirt and dust from entering the motor, and the ball bearings are grease-packed in dustproof

housings. The Model No. 2500 comes equipped with one grinding wheel, wheel guard (with grip handle optional), 25 ft. of four-conductor cable and attachment plug.

Ex-Cell-O Series No. 35 Production Thread Grinder

An improved line of series No. 35 production thread grinders is now being offered by Ex-Cell-O Corporation, 1200 Oakman Blvd., Detroit, Mich. Features include temperature control for coolant for increased precision, a new method of dressing grinding wheels using interchangeable cams for different thread forms, greater rigidity by elimination of overhanging supports, ability to grind in both directions, eliminating time lost during return stroke, lead compensation for maximum accuracy regardless of room temperature, provision for grinding tapers up to 2 in. per foot, provision for truing grinding wheels without slowing down the wheels, and so on.

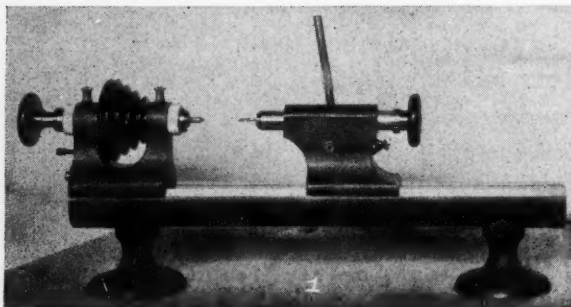
The ability to grind in both directions is made possible by an endwise shifting of the lead screw, taking out all backlash, as the hydraulic motor driving the

DERBYSHIRE WATCHMAKERS LATHES

W. W. Length of Bed 12 inches
Large Center Height 5 cm or 1.97 inches
Magnus Swing 10 cm or 3.94 inches

THROUGH CAPACITY

W. W. : 5 mm or .197 inches
Large : 6.35 mm or .250 inches (¼")
Magnus : 8 mm or .3125 inches (5/16")



DERBYSHIRE ELECT LATHE

Length of Bed 15 inches with 1 Pedestal
Length of Bed 18 inches with 2 Pedestals
Center Height 6 cm or 2.36 inches
Swing 12 cm or 4.72 inches
Through capacity 8 mm or .3125 inches (5/16")

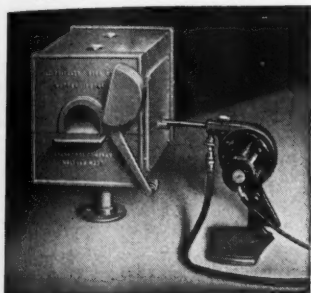
SEND FOR OUR NEW CIRCULAR

F. W. DERBYSHIRE, INC. WALTHAM, MASSACHUSETTS, U.S.A.

"Stark"

"ELECTROBLAST"

High Speed Heat in 20 Minutes



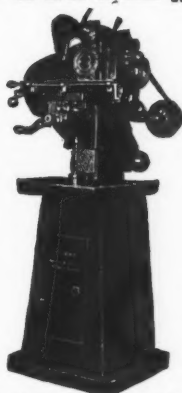
Powerful torch used separately as a very handy portable flame, \$40. High Speed Muffle Furnace, no scaling or decarburization, reaches high speed heat in 20 minutes at 7c per hour; quickly saves its cost. Muffle 7"x3 1/2"x2 1/4", \$40. Also a larger furnace with built-in torch, muffle 7"x4 1/2"x3 1/2".

STARK TOOL CO.

Originators of the American Bench Lathe
Est. 1862 Waltham, Mass.

BURKE

Milling Machines



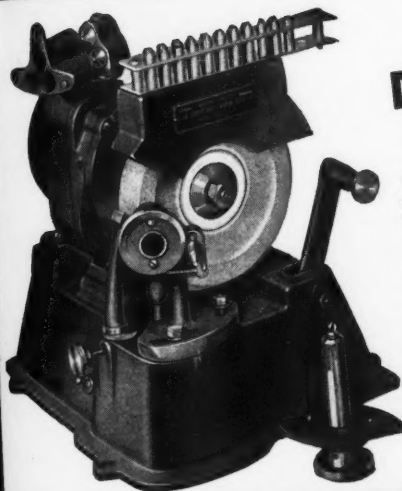
Burke motor driven milling machines, Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

BURKE MACHINE TOOL CO.

297 E. 16th St.

Conneaut, Ohio



ACCURATE DRILL GRINDING MADE SIMPLE

It's a simple job to grind drills accurately on a BLACK DIAMOND Drill Grinder—ANYONE can do it. No adjustments are necessary for grinding drills from No. 60 to 3/4". BLACK DIAMOND drill grinding quickly pays for the machine and continues to reduce your costs and increase your profits. Write for Bulletin No. 121.

BLACK DIAMOND SAW & MACHINE WORKS, INC.

45 North Ave., Natick, Mass.

work spindle is automatically reversed at the end of each stroke. This shift is accomplished so fast on the new No. 35 that the work spindle and direction of cut may be reversed while the wheel is still in the cut.

Another feature of the machine is the infinite variability as to speed of the

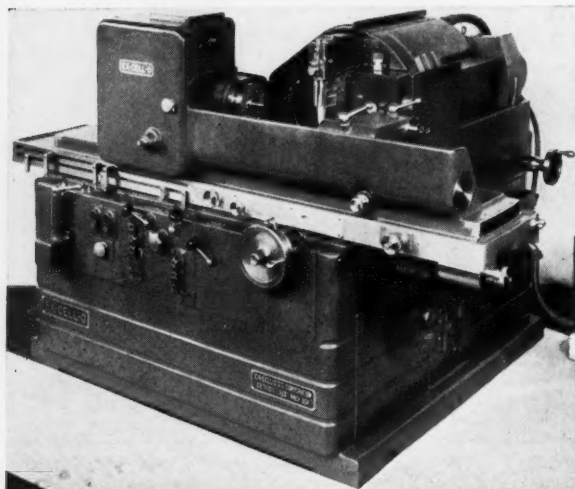
pensator provided to take care of changes in the lead of the work due to room temperature or coolant temperature variations, but an oil cooler is also available to maintain constant cooling temperatures.

Wheel dressing has been arranged so that the wheel can be dressed without slowing down the wheel. This is thereby dressing the wheel under actual operating conditions and eliminating the chance of introduction of errors.

In this connection, the new cam-type universal dresser is of particular interest. With this automatic dresser, using the proper interchangeable cams, grinding wheels can be dressed to grind external threads with S. Standard, 60 deg. Sharp, V, Acme, Whitworth and special thread forms. The unit is hydraulically power driven and is operated by a lever on the front of the machine. Time lost in unnecessary dressing of wheels is thus eliminated.

A special internal grinding attachment is available for backing off hobs, and so on. The set-up permits the use of the smaller grinding wheel that is necessary to make the

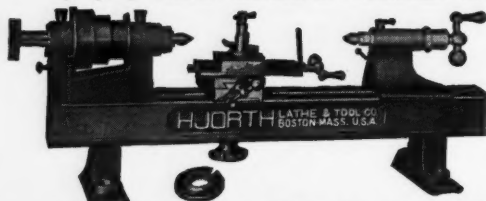
grinding of this type of work practical. No attachment is necessary for grinding taper threads in either direction of table travel up to 2 in. per foot. This is accomplished by swiveling the table and correcting the lead by a simple adjustment of a hand knob on the front panel of the machine.



Maximum accuracy in production thread grinding is provided in the new Model No. 35 Ex-Cell-O Grinders. Accuracy features include an oil cooler for coolant, and lead compensation to allow for changes in room temperature, and so on.

hydraulically operated work spindle, which permits setting the machine to operate at the exact maximum speed possible for each job, instead of limiting available speeds to stops as with change gears. Of particular interest is the attention given to insuring maximum accuracy. Not only is a lead com-

... for more than 1001 odd jobs

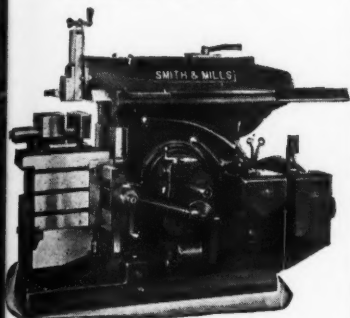


The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeal to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

Write today for data and prices.

HJORTH LATHE & TOOL CO., 12 BEACON ST., WOBURN, MASS.

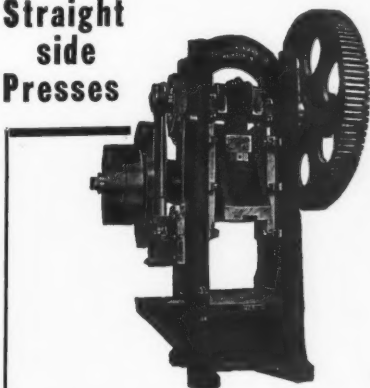
SMITH & MILLS SHAPERS



Automatic lubrication—forced feed. Multiple
dutch and brake. Quick feed changes.
Direct reading feed and stroke dials. Power
rapid traverse to cross feeds.

THE SMITH & MILLS CO.
CINCINNATI OHIO

Straight side Presses



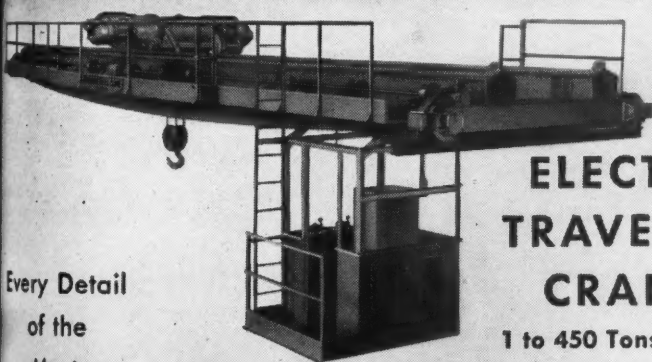
—Outstanding in every detail for
heavy blanking and forming work.
All stresses are taken centrally.

Write for new catalog illustrating and
describing this and other presses.

Zeh & Hahnemann Co.

184 Vanderpool St.

Newark, N. J.



ELECTRIC TRAVELING CRANES

1 to 450 Tons Capacity

Every Detail
of the
Most
Advanced
Design

SHEPARD NILES
CRANE & HOIST CORP.

424 SCHUYLER AVENUE, MONTAUR FALLS, N. Y.

A COMPLETE LINE OF CRANES AND HOISTS

The Putnam Universal GRINDING FIXTURE



**MAKES EVERY
SHARPENING
JOB EASIER**

**MAKES MANY OF THE
MOST DIFFICULT JOBS POSSIBLE**

● Operates on same principle as grinding between centers. All horizontal motion is controlled by movement of machine table.

● Holding unit is extremely sensitive due to ball bearing construction. Eight units furnished with each fixture cover entire range of end mill sizes from $\frac{1}{16}$ " to 2" diameter.

● Swivel arm carries tool completely away from wheel, permitting safe, easy insertion or removal of tool without changing setting of machine or fixture.

● Extremely flexible in application. Can be used in regrounding a wide variety of cutting tools. Permits grinding of end teeth or any desired taper.

Write for descriptive folder.

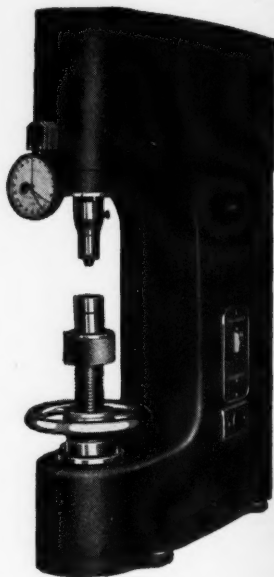
PUTNAM TOOL COMPANY

2981 Charlevoix Ave. • Detroit, Mich.

Model "PR" Pyro-Universal Production Hardness Tester

Pyro-Electro Instrument Co., 7323 W. Chicago Blvd., Detroit, Mich., has augmented its line of Rockwelling and Brinelling instruments by the addition of the Model "PR" Pyro-Universal Production Hardness Tester.

Designed for hardness testing in volume production, the instrument is available in different speeds for manual and



Model "PR" Pyro-Universal Production Hardness Tester

automatic feed, power being supplied by a fractional horsepower ratiometer, with a maximum of 2700 hardness tests per hour.

Elevation by hand wheel is only required for the original adjustment of the specimen, the minor load of approximately 10 KG dead weight being applied automatically and remaining constant. Major loads readings in "C", "B", and "A" scales are obtained under dead weight loading at 60 KG, 100 KG and 150 KG. Adjustment of major load is effected through interchangeable calibrated weights.

Direct readings in all scales are given on an indicating dial with but one set of black numerals. The accuracy of the

**Why Use A Shaper
to cut Keyways when a**

**DAVIS
KEYSEATER**

**will do the
job so much
quicker
and
better?**

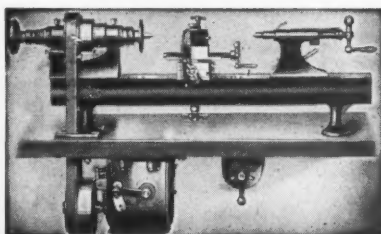
Send
for
circular

DAVIS KEYSEATER CO.

Exchange & Glasgow Sts.
ROCHESTER, N. Y.



"Stark"



**HAVE YOUR STARK LATHE OR MILLER
RECONDITIONED NOW**

We restore them in most cases almost to the accuracy of new ones. Write us about repairs. Stark Precision Bench Lathes (6 sizes) Spring Bind Heads, for fast chucking. Auto Turret Heads. Motor Drive Unit above, fits any bench lathe on any bench. Milling Attachment. Diamond Drills. Diamond Die Polishers. Collets. Chucks. Special Precision Tools. "Electroblast" Torch and Muffle Furnaces.

STARK TOOL CO.

Originators of the American Bench Lathe
Est. 1862 Waltham, Mass.

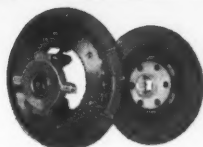
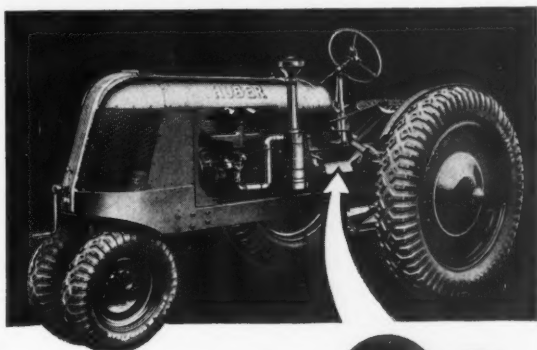
ROCKFORD Over-Center CLUTCHES

Provide New Shifting Ease

Important new features of Rockford O-C Toggle-Type Clutches provide new shifting ease, operating facility and selling features for equipment in which they are used. Roller cams reduce shifting friction, the method of mounting the clutch reduces spinning action of transmission parts to a minimum. Other features provide uniformly distributed driving pressure, afford highly efficient operation over unusually long periods of time without attention. Rockford O-C Clutches remain positively engaged or disengaged until the position of the operating lever or pedal is changed. For service requiring an automobile-type clutch, use Rockford Spring-Loaded Clutches. Comparative sizes of the two types are interchangeable, a distinct advantage when the same motor is used for different types of service. Write today for complete information.

ROCKFORD DRILLING MACHINE DIVISION

Dorg-Warner Corporation, 300 Catherine Street, Rockford, Illinois, U. S. A.



A 10" Rockford O-C Clutch is used in the Huber tractor shown. Rockford Clutches are made with single or double drive plates, for operation in oil or dry, in sizes ranging from 6" to 30" diameter for transmitting 2 to 80 h.p. at 100 r.p.m.

September, 1938

MODERN MACHINE SHOP 157

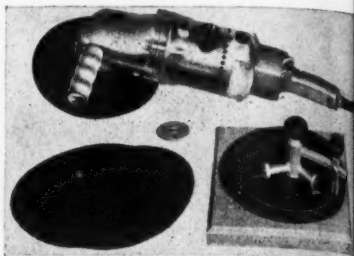
readings is within the limits of standard test bars. An ingenious elevating anvil compensates for variations in stock to tolerances in excess of 0.125 in. An adjustable shield covers the penetrator (which is standard size) at all times, except during contact with the specimen, thus assuring complete protection from damage.

Van Dorn 7-9-In. Two-Speed Electric Sander

A versatile two-speed sanding unit, adaptable to use with both 7 and 9-in. abrasive discs, has been announced by the Van Dorn Electric Tool Co., Towson, Md. Developed to eliminate the necessity of purchasing two tools of different speeds in order to use 7 and 9-in. discs, this tool is said to fill a definite need in general sanding operations. As most of the wear on a sanding disc occurs toward the outer edge, it is possible, with this machine, to get the maximum wear from a 9-in. disc and by trimming off the worn outer surface, obtain a 7-in. disc that is practically unused. A disc cutter is furnished with each tool and is very simple and easy to use.

The speed adjustment is made by means of a simple gear shift arrange-

ment in the gear housing, which automatically engages two different sets of double gears. Armature and interme-



Van Dorn 7-9-In. Two-Speed Electric Sander

ate gears are spiral and the spindle gear is spiral-bevel. The unit is equipped with a patented gear locking pin to facilitate interchange of flexible pads and the gear-shifting adjustment.

Two moulded pads (7 and 9 in.), together with three 9-in. abrasive discs are supplied with each tool. The top load speed for the 7-in. discs is 2700 r.p.m.; for 9-in. discs, 2700 r.p.m. universal motor, operating on alternate



**Save 50% to 60% and More
on Your Tool and Die Work
with an OLIVER of ADRIAN
DIE MAKING MACHINE**

FAST-ACCURATE-EFFICIENT

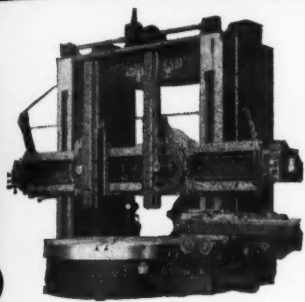
on all Sawing, Filing and Lapping Operations

Just the machine you need to cut those corners and turn losses into profits.

Thousands of machines in use in every part of the world.

Only a \$125.00 investment—Order one today. Other models for materials up to 3" thick.

OLIVER INSTRUMENT CO.
1430 MAUMEE ST. ADRIAN, MICH.



VERTICAL BORING MILLS
PLANERS, Double Hous-
ing, Openside

CRANK PLANERS
PLANNER TYPE MILLERS

WRITE FOR BULLETIN

THE CINCINNATI PLANNER CO.
CINCINNATI OHIO

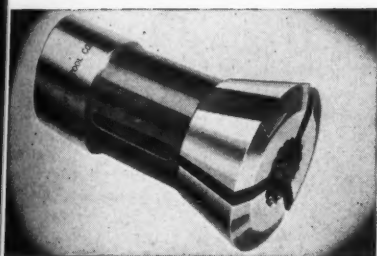
GRANT RIVETERS



● **Pioneers in the riveting field. Head**
rivets from smallest to $\frac{1}{2}$ " diameter,
either by noiseless spinning or vibrating
hammer method.—Sizes to meet all needs.—
Types include Vertical and Horizontal
Multiple Spindles.

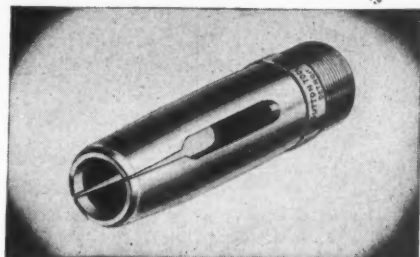
Write for literature — and don't forget to
send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport, Conn.



Sutton DIAMOND-GRIP COLLETS

DIAMOND SERRATIONS clear them-
selves of dirt and chips, and grip tighter
under less tension. Sutton Collets fur-
nished in single-piece and master styles
for all makes of screw machines.



Sutton Feed Fingers

Made from selected alloy steels, expertly
heat-treated, ground all over on hard-
ened arbors. You can depend on them
for a sure grip and long life. Furnished
in single-piece and master styles for all
makes of screw machines.

Be sure your reference file has a copy of the complete
Sutton Catalog of Screw Machine Accessories. Copy on request.

SUTTON TOOL CO. 2842 W. Grand Blvd. DETROIT, MICH.

ing or direct current, is standard equipment.

"Milwaukee" Three-Speed Heavy-Duty Sander

A three-speed 9-in. heavy-duty portable electric tool has been brought out by the Milwaukee Electric Tool Corpora-



"Milwaukee" Three-Speed Heavy-Duty Sander

tion, 120 N. Water St., Milwaukee, Wis. This streamlined tool is said to be actually three machines in one—a two-speed sander, a feather-edger and a polisher.

A simplified form of gear shift requires only the moving of a lever on the side

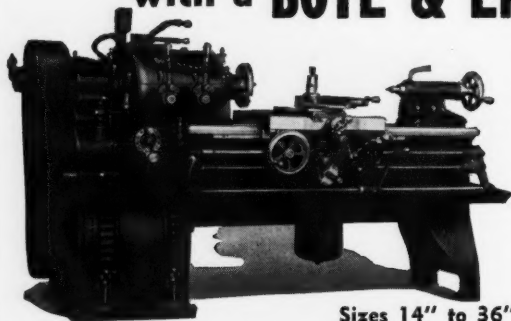
of the machine to change speeds. The low speed with the curved-face flexible steel backing pad is used for feather edging paint with a special sandpaper disc, and for polishing with a lamb's wool pad. The intermediate speed is used with the 9-in. flat nested spring steel backing pad for grinding off high spots and for metal surfacing. The high speed is used with the 7-in. flat nested spring steel backing pad when the abrasive disc is trimmed from 9 to 7-in. diameter. According to the manufacturer, the Milwaukee Three-Speed Heavy-Duty Sander makes it possible to complete the entire job of removing paint, sanding, feather-edging and polishing at the correct speed.

Elgin A. C. Type Arc Welder

The illustration shows the Elgin A. C. Type Arc Welder which is now being marketed by Borm Manufacturing Co., Elgin, Ill. The manufacturer states that this welder will weld thin metal as well as heavy metal, and that the operation can maintain a free-flowing and flexible arc even on the lowest heats.

The welder is built for hard service and is housed in a non-metallic case which is said to eliminate wasted energy

ALWAYS A STEP AHEAD with a BOYE & EMMES LATHE



Sizes 14" to 36"

THE BOYE & EMMES MACHINE TOOL CO.
CINCINNATI OHIO

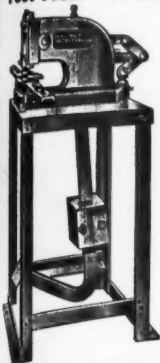
frequent complete redesigning enables our engineers to incorporate into BOYE & EMMES Lathes every worthy new improvement and many original and exclusive developments in lathe construction. BOYE & EMMES Lathes are modern in every respect.

Write for Facts on MODERN BOYE & EMMES Lathes.



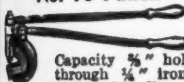
"The Lathe With The Longer Life"

Foot Press No. 28



Capacity 2" hole in 16
page — 100 holes per
minute.

No. 10 Punch



Capacity $\frac{3}{4}$ " hole
through $\frac{1}{4}$ " iron.
Weight 8 $\frac{3}{4}$ lbs.

Angle Iron Shear No. 4



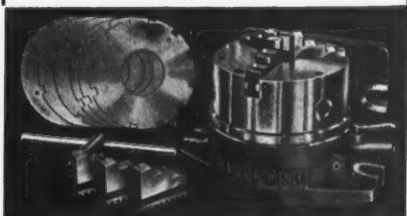
capacity
2x2 $\frac{1}{4}$ "
Angle Iron
Weight
44 lbs.

ASK FOR
CATALOG
No. 10

80 ITEMS
FROM WHICH
TO CHOOSE

WHITNEY METAL TOOL CO.
11 FORBES ST. ROCKFORD, ILL.

For Fast-Accurate Indexing



The Hartford 'SUPERSPACER'

ADAPTABLE for milling, drilling,
slotting or planing.

FOOLPROOF — mask plates prevent
errors.

RAPID INDEXING — release clamp,
withdraw index plunger, revolve turret.

QUICK SET-UP . . . ACCURATE . . . RIGID

Write for folder.

Hartford Special Machinery Co.
HARTFORD • CONN.

Their **UNIFORMITY SPEEDS** your **PRODUCTION**

There's no lost time for your mechanics
when they're using "Unbrako" Socket
Screws . . . our accurately controlled
machining assures absolute uniform-
ity. Every one alike . . . every one
a perfect fit.

Write for our catalog that tells
the advantages you get when
you specify Knurled "Un-
brako" Socket Head Cap
Screws. Your copy will
be sent at once.

KNURLED

UNBRAKO

Socket Head Cap Screws



Fig. 1434
Pat. Pending

STANDARD PRESSED STEEL CO.

BRANCHES

BOSTON

DETROIT

INDIANAPOLIS

JENKINTOWN, PENNA.

BOX
556

BRANCHES

CHICAGO

ST. LOUIS

SAN FRANCISCO

MULTIPLE SPLINE...



Brute force does not strip or round out Bristo Cap and Set Screws. Of the performance-proved multiple spline socket design, Bristos permit a much T-I-G-H-T-E-R set-up with no danger of loosening in tough service. Write for Bulletin 833 today. The Bristol Company, Mill Supplies Division, Waterbury, Connecticut.

BRISTO
Multiple Spline

SET AND CAP SCREWS

and short circuits. Twelve heat ranges are provided and the welder will handle 1/16 to 3/16-in. rod. The electrical cost



Elgin A.C. Type Arc Welder

to operate this welder is said to be approximately eight cents per hour. Shipping weight is 235 pounds.

Watson-Stillman Uniflo Pump

The Watson-Stillman Co., Roselle, N. J., announces a new and improved hydraulic pressure pump.

The Uniflo pump is said to represent the successful combination of the "swash-plate" form of operating mechanism with conventional packed plungers and poppet valve features. This arrangement insures compactness, enclosed operating parts, minimum pulsation in delivery and high mechanical efficiency.

The most compact installation is that illustrated below. Here the pump is directly connected, through a flexible coupling, to a gear head motor. Where it is desired to use a standard motor, fully enclosed helical reduction gears are furnished. In either case the pump and motor are supported on a heavy ribbed bed plate.

The power unit is entirely separate from the hydraulic end and is fully enclosed. Adequate lubrication is provided

NEAT STAMPING in NAME PLATES



This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc.
1806 Belle Plaine Ave., Chicago, Ill.

**EXTRA!
EXTRA!**



**OUT SOON!
NEW 1939**

Atlas CATALOG
FEATURING THE LATEST
IN
METAL & WOODWORKING
LATHES · DRILL PRESSES
ARBOR PRESSES · SHAPERS
TOOLS & ATTACHMENTS

RESERVE YOUR COPY NOW!

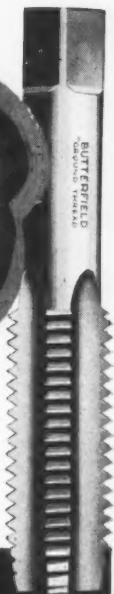


Write

ATLAS PRESS CO.
946 N. Pitcher St., Kalamazoo, Mich.

**LATHES · DRILL PRESSES
ARBOR PRESSES · SHAPERS**

BUTTERFIELD *Taps*



When you specify Butterfield taps on your jobs you know they will give you long and accurate service. Butterfield High-Speed Steel "Commercial Ground" Taps produce "Class 2 Fit" Tolerances until entirely worn out. Butterfield Taps are profit-makers on long production runs.

**UNION TWIST DRILL CO.
BUTTERFIELD DIVISION**

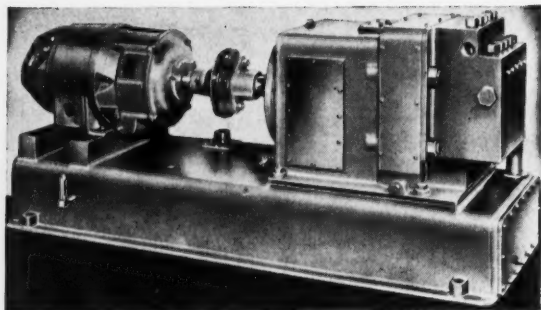
Derby Line

Vermont

STORES:

NEW YORK...
61 Rende Street
CHICAGO...
11 S. Clinton St.

CLEVELAND...
3342 Superior Avenue
DETROIT...
6340 Antoine St.



Watson-Stillman Uniflo Pump

and as long as the proper oil level is maintained, lubricating troubles are practically eliminated.

The hydraulic end is a single piece steel forging drilled for plungers and valves. The novel arrangement of passages and valves permits the use of plungers disposed in a circular arrangement with transverse suction and discharge passages extending through the block.

Pumps up to $7\frac{1}{2}$ horsepower are designed with five plungers, larger sizes with seven, giving an unusually uniform

discharge curve. Piping may be attached to either side as is most convenient. The position of valves and bonnets is such that they are readily accessible without disturbing the piping.

Uniflo Pumps are available in standard sizes from 2 to 100 h.p. for pressures of 1500 lbs. per sq. inch and upward. They will handle equally well oil, water or any other hydraulic medium. Sizes up to 25 h.p. can be furnished with variable delivery from zero to maximum through the use of a variable speed transmission.

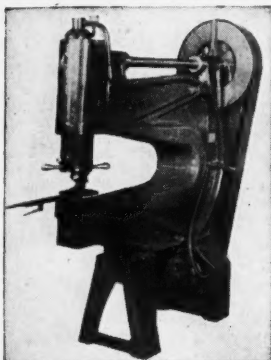
While primarily designed for high pressure service, the use of a liquid end separate from the power unit permits the installation of special pump bodies and plungers for low pressures or for use with corrosive liquids.

"Down-Grip" Vise

The "Down-Grip" Vise announced by the Kravan Company, 125 Maple St., Waterbury, Conn., is said to offer makers and users of machine tools important

Savage Nibbling Machines

Direct Over-Center Drive One-Piece Revolving Head Totally Enclosed.

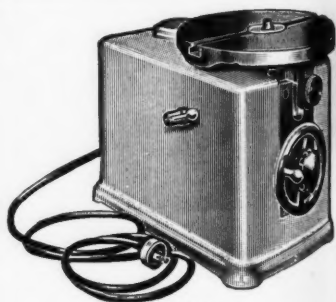


The Modern Method for Fast and Accurate cutting of Sheet Metals.

Capacities to $\frac{3}{4}$ "—Throat Depths to 36"

W. J. SAVAGE COMPANY

KNOXVILLE Since 1885 TENNESSEE
Pioneer Manufacturers of Nibbling Machines.



Boyar-Schultz

PROFILE GRINDER

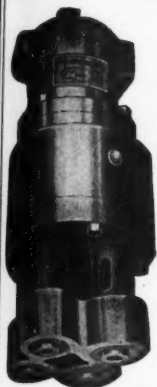
With Sine Bar Adjustment

A Precision Machine Tool that SAVES TIME in fitting Dies and Punches and in making Templates, Profile Gages, Form Cutters and Cams.

Write For Demonstration On Your Own Work

BOYAR-SCHULTZ CORPORATION
2120 WALNUT ST. CHICAGO, ILL.

U.S. SPECIAL DRILL HEADS



U. S. Drill Heads are made in standard and special sizes. If your job requires special drill heads, our years of specialization in this work will save you money and assure an accurate dependable and swift job. Send your blue prints for estimates.

The United States Drill Head Co.
1354 Riverside Drive
CINCINNATI, OHIO

ANNOUNCING The Improved M-B "Super-Speed" AIR GRINDER

AMAZING POWER



THRILLING SPEEDS

Steel construction throughout. Positive quick acting air control valve. The ONLY hand grinder with spindle speed of 100,000 R. P. M. on 100 pounds air pressure. Operates on air pressures of 40-100 pounds. Weighs 14 ounces.

Write for full particulars.

M-B PRODUCTS

130 E. LARNED ST., DETROIT, MICH.



MAC-IT MAKES SCREWS YOU WON'T BREAK!

ALL 16 OF US STANDARD MAC-ITS ARE
STRONG—INVITE US INTO YOUR PLANT
TO STOP BROKEN SCREW HEADACHES!

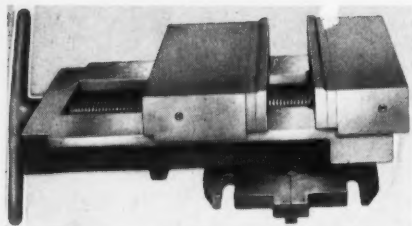
Why chance weak screws when Mac-it makes screws you won't break? Sixteen standard items—socket screws to tool post screws—meet almost any need. See them all in Mac-it's new catalog 3815. Send for free copy TODAY!
FREE Block Buster prover set. Drive a $\frac{3}{8}$ " Mac-it square head set screw through a steel block! Write for your set today.

The Strong, Carlisle & Hammond Co.
1392 West Third St., Cleveland, O.

Mac-it's
PRONOUNCED
"MAC-ITS"

THE ONLY COMPLETE LINE OF
HEAT-TREATED, ALLOY SCREWS





Kravan "Down-Grip" Vise

advantages in speed and accuracy of set-up because the jaws exert not only an equalized face grip but also a downward pull which automatically levels the work, either against the precision machined base of the vise or against parallels placed between the base of the work, without resort to tamping.

The design and construction are such that this down-grip action, occurring simultaneously with the equal side pressure on the jaws, will not distort the work or cause slippage. The "Down-Grip" Vise is built to heavy duty specifications and to meet in all respects the high precision standards of modern production equipment.



**POWER
RIGIDITY
ACCURACY**

WALKER ROTARY SURFACE GRINDERS

For profitable surface grinding on a wide range of work—write for catalog DB-2.

O. S. WALKER CO., INC.
WORCESTER, MASS.

**USL A.C. Transformer Type
Protected Arc Welder**

The illustration shows an alternate current arc welding machine which has been placed in the market by the Over Dyneto Corporation, Syracuse, N. Y. Features of the machine are said to insure the highest possible efficiency and wide range of application. It is designed to connect to any standard voltage or frequency power line and is rated at 150 amperes with a range of from 10 amperes to 280 amperes output. Operating circuit voltage of 55 volts maintains 30 volts to 30 volts across the arc. It is stated that the unit was designed to fill the demand for a quality A.C. welder that would meet the most grueling service requirements over a long period of time.

The welder is constructed to speed up the welding process. Any commercial A.C. welding rod can be accommodated. The welder is built to provide thorough penetration for heavy work, yet can be cut down to the lower heat requirements for welding thin sheets. Range ranging from 1/16 to 1/4-in. diameter can be used.

The arc is stabilized by means of a reactor on the secondary winding of the

**GRAY TURRET HEAD
METAL CUTTER OR NIBBLER**

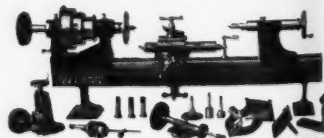


Cuts all metals any shape—30 gauge up to 1".

GRAY, Originator of First Practical Metal Cutter or Nibbler. GRAY Cutters Built Lead.

GRAY MACHINE CO.
Dept. A., P. O. Box 594, Philadelphia, Pa.

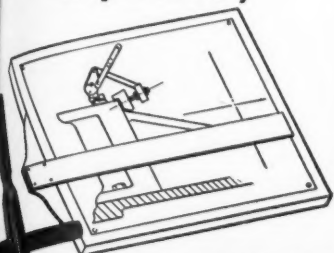
ELGIN Precision Bench Lathe



For precision, accuracy and absolutely true work. Write for details.

ELGIN TOOL WORKS, INC.
57 N. State St. Elgin, Illinois

Investigate and Specify
Incorporate — And
They'll Satisfy



KNU-SINE
UNIVERSAL ACTION
TOGGLE CLAMPS

3 DISTINCT SIZES
Send for Catalogue

Knu-Vise Products Company

6434 Cass Avenue, Detroit, Mich.
SALES AGENTS IN PRINCIPAL CITIES

Throw some **LIGHT**
on the subject!

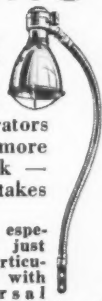
BETTER
WORK

MORE
WORK



WITH
VIMCOLIGHTS

VIMCO Lights put the
light right on the job
—where it is needed most.
With proper Vimco light-



ing, your operators
will produce more
and better work —
have fewer mistakes
and accidents.

The lights are espe-
cially designed, not just
adapted, to your particu-
lar needs. Furnished with
3 types of universal
mounting brackets and 8 styles of
sockets. Durable and attractive.
Vimco Lights are the choice of
many leading manufacturers of
metal-working equipment of vari-
ous kinds.

Complete Vimco equipment
as low as \$1.55 to \$2.35. Order
now or write for full informa-
tion.

VIMCO MFG. COMPANY, Inc.

111 CHENANGO ST.

BUFFALO, N. Y.

Improved
Anderson
**Balancing
Ways**

No Leveling
Required

A simple and
excellent de-
vice for bal-
ancing,
straightening
and truing.

They are made in
the following sizes:

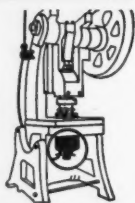
Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

Four-Chilled
iron-discs
rotate on
sensitive
Special
bearings.



Write for Full Information

Made
by **Anderson Bros. Mfg. Co.**
1926 Kishwaukee St., Rockford, Ill.

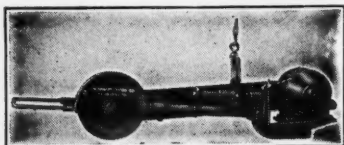


Equip your presses for deep drawing work for as low as \$75.00, complete.

Write for our engineering booklet on deep drawing die work.

DAYTON ROGERS MFG. CO.
MINNEAPOLIS, MINN.

MUMMERT-DIXON SWING FRAME GRINDERS



Sizes 14", 16", 18", 20" and 24" wheels

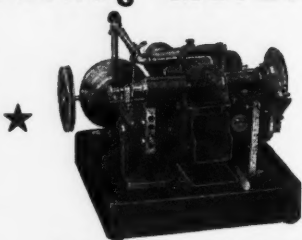
ASK FOR DESCRIPTIVE CIRCULAR

MUMMERT-DIXON CO.

120 Philadelphia St.

Hanover, Pa.

"Waltham" Pinion Cutting Machines



FAST AND ACCURATE

Operator can attend to several machines. For small pinions, a magazine feed not shown in the cut allows the machine to run without stopping, materially increasing the production. One, two, or three cuts, according to the nature of the work, may be made.

WALTHAM MACHINE WORKS
WALTHAM, MASS.

transformer which creates a power flux where the cycle passes the point. The arc is constantly maintained and results in faster, easier welding with noticeably less spatter. Simplicity of control is emphasized by the dial. The transformer is of mild steel and the coils are of flat wire copper. All connections use flat bars, and all leads are given careful right angle bends that entirely eliminate interference and possibility of short



USL A.C. Transformer Type Protected Welder

circuits. Necessity for a cooling fan is eliminated. The unit is compact and the case is finished in a black enamel finish. Weight, 190 pounds.

Bunting Precision Bronze Bars

The Bunting Brass & Bronze Company, Toledo, Ohio, are announcing their new line of Cored and Solid Bronze Bars, be known as "Bunting Precision Bronze Bars." The material used in these bars was developed to provide an alloy that would have ample strength to resist heavy loads and perform satisfactorily under many different adverse operating conditions and at the same time embody exceptional anti-frictional qualities giving long life and a minimum amount of wear.

Known as Bunting No. 72, also as B660, this metal has been adopted as a given specification numbers by the majority of machinery manufacturers desiring a metal of great durability that at the same time is more ductile than the unyielding alloys formerly in general

a power
sees the
y main
welding
implicity
the an
of all
flat wou
se flat
even can
irely elim
lity of sh

MOST CUTTING TOOLS

ROUND RADIAL
RELIEF



CIRCLE "R"

Combination Center Drills
will give more production at less
cost. Be sure to demand Circle "R"
Tools.

Send for Catalog "J"

CIRCULAR TOOL CO., Inc.
PROVIDENCE RHODE ISLAND

BRANCHES—Chicago, Detroit, Indianapolis,
Philadelphia, Cleveland, New York

BAUMBACH



STANDARDIZED DIE SETS

Machined
Steel
Semi-
Steel

DROP FORGED STEEL
Standardized Die Sets, embodying
many exclusive features, a listing of
more than 185,000 stock sizes and 46
different styles afford a service that
is unsurpassed.

Send for Our New 288-Page Catalog

E. A. Baumbach Mfg. Co.

1806 S. Kilbourne Ave., Chicago, Ill.

Announcing

The New Hamilton Catalog of Drafting Room Furniture

For latest information on Drawing Tables,
Filing Equipment, and Drafting Room Acces-
sories . . . refer to the new 64 page Hamilton
Catalog. It contains helpful suggestions on
filing tracings and drawings . . . shows 26
different styles of drawing tables . . . has a
full description of the complete Hamilton Line
of Drafting Furniture.

*Your copy is sent with-
out obligation . . . just
fill in and mail this coupon.*

Hamilton Manufacturing Co. TWO RIVERS, WISCONSIN

HAMILTON MANUFACTURING CO.
Two Rivers, Wisconsin

Send me your new Eleventh Edition Catalog
of Drafting Room Furniture

Name and Pos.
Firm
Address
City and State

MMS-9-38

HAMILTON

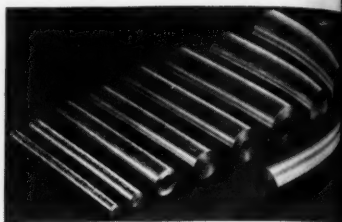
Drafting Room FURNITURE

use. A thorough survey of bearing life in both laboratory and field proved conclusively that this alloy, composed of 83 per cent copper, 7 per cent tin, 7 per cent lead and 3 per cent zinc, had the ability to furnish the desired requirements and was more kind to the shaft than bronze alloys previously used.

The new Bunting Precision Bronze Bars are made by a new casting technique which produces a metallic structure of unvarying uniformity regardless of diameter or wall thickness. This

technique also produces added frictional and wear-resisting properties.

The bars, in addition to the machine outside diameter and 13 in. length, are still further improved by having



Bunting Precision Bronze Bars

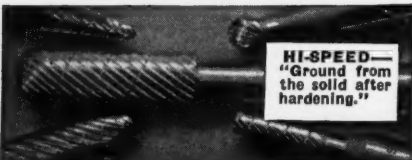
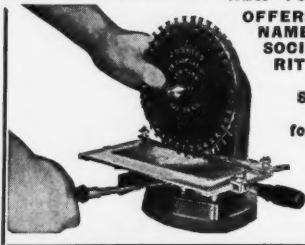
H. O. BATES

68 BARCLAY ST.
NEW YORK, N. Y.

OFFERS A NEW
NAME-PLATE &
SOCIAL SECURITY METAL

CARD
STAMPING
MACHINE
for \$85.00

Ask for
FREE
Sample
Card with
your
Number.

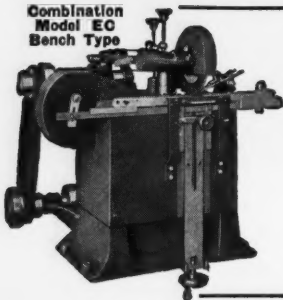


SEVERANCE MIDGET MILLING CUTTERS
Large stock of Standard cutters. Any shape, any size—custom made for burring, counter-sinking, taper-reaming, tube burring and facing, ball socket reaming, trepanning, etc. Submit your problem to our engineers. CATALOGUE ON REQUEST

Severance Tool Mfg. Co.

1518 E. Genesee Ave., Saginaw, Michigan

Combination
Model EC
Bench Type



SHARPEN YOUR OWN SAWS

SAVE OVER 80% ON SHARPENING
HACK, BAND, CIRCULAR SAWS

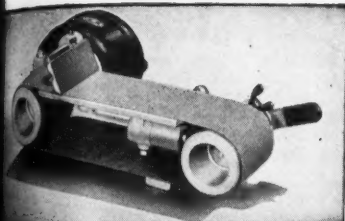
The **WARDWELL SAV-A-SAW** automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

Write for complete information.

THE WARDWELL MFG. CO. 3186 Fulton Rd., Cleveland, O.

Electric Engrav-rite

The "Electric Engrav-rite" electric marking tool announced on page 140 of the August, 1938 issue of **MODERN MACHINE SHOP** is a product of the **Chicago Manufacturing Co.**, 415 Aberdeen, Chicago, Ill. This firm is represented by sales agents in the more important industrial centers.



NEW ABRASIVE BAND GRINDER...

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with supporting legs under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER

WALLS SALES CORP.

WARREN ST. NEW YORK, N. Y.

New!

MARCLIFF 8" SHAPER

ATTACHMENT FOR YOUR LATHE



STURDY
ACCURATE
DEPENDABLE

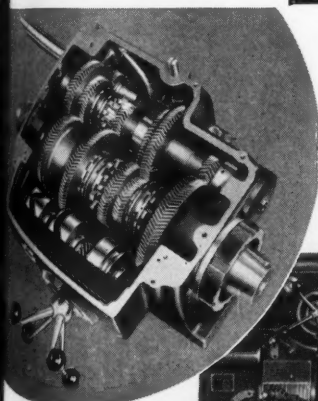
Shown Mounted on 9" South Bend Lathe

Automatic Feed, All Lathe Speeds. Unlimited Stroke Adjustment \$165.00

COMPLETE WITH VISE
Territories Available For
Established Dealers

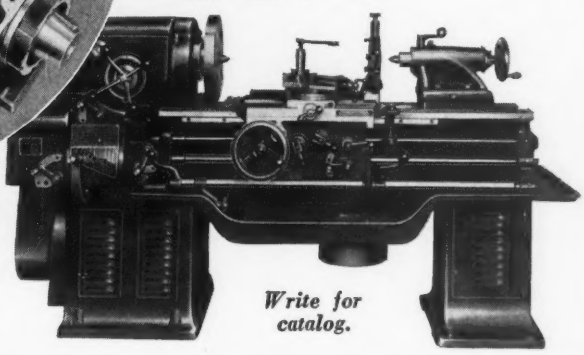
Write

FUCHS MACHINERY & SUPPLY CO.
OMAHA 1102 FARNAM NEBR.



All-Herringbone Transmission Only in SIDNEY Lathes

An all-herringbone transmission, composed of 12 continuous-tooth gears, completely eliminates all gear tooth or tool marks from the work. Controlled by Monotrol (1 dial) or Tritol (3 levers). Sizes 14" to 24".



Write for catalog.

THE SIDNEY

MACHINE TOOL CO.

210 Highland Ave.,
Sidney, Ohio

added
ing proper
the machine
n. length
y having

ze Bar

e bore to
as have
ting in a
possible
is left on
bearing b
d on the
in. cut.
with the
cut, and
of the bar
ully mach
are now
g Toledo
throughout
able thro
rs.

rite

ite" elec
page 140
MODERN
of the Co
berdeen
presented
important

SAWS
NING
SAWS

sharpen
t a good
blades will
saws at

Cleveland, O.

No. 3079 1/2 GOGGLE
Leather
Side Shield



Industrial
EYE
Protectors

SELLSTROM EXCEL-QUALITY

Styles specially adapted to comfort-needs of every working craft. Light weight—adjustable—ventilated—economical. **WRITE** for special information about Welders' Helmets, Goggles, Spectacles, Lenses and Respirators.

Sellstrom Mfg. Co. 645 N. Aberdeen St. Chicago



For Machine and Tool Work and Quick Set-Ups

use Reich's, the only 3 way reading precision Indicator. Contact point mounted in centered cone bearings. .014 reading. Order direct or through your dealer.

Price
\$5.00
Write for folder.

J. R. REICH MFG. CO.
334 Triangle Ave. Dayton, Ohio

NAILS · RIVETS · SCREWS

MADE TO ORDER IN ANY METAL



HASSALL
Products

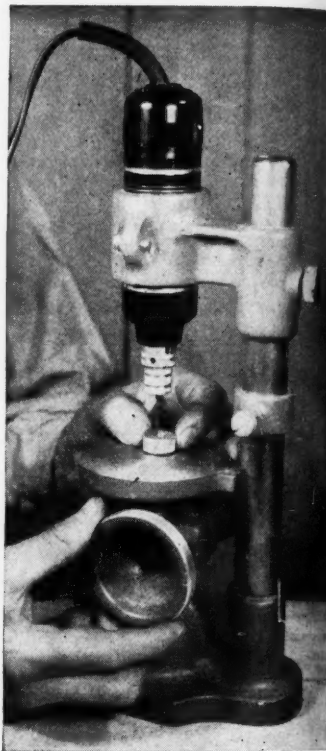
CLAY & OAKLAND STS.
BROOKLYN, N.Y.



Write for
Illustrated Catalog

DeLuxe Handee Precision Drill Press

Chicago Wheel & Manufacturing Co. Dept. OO, 1101 W. Monroe St., Chicago Ill., is now marketing a precision drill press consisting of a drill press stand and DeLuxe Handee Unit. The tool is said to be capable of accurately



DeLuxe Handee Precision Drill Press

rapidly drilling holes from 1/8-in. diameter down to the smallest drill with commercial limits. Precision throughout with a wide range of adjustments, the tool can be permanently attached to the bench or easily carried to the work.

The unit is powered by the DeLuxe Handee with which a speed of 2500 r.p.m. can be obtained. Special shanks from 1/8 to 1/16 in., graduated in six-fourths of an inch, are available mounted on 1/8-in. shanks for

sion Drill

facturing Co.
St., Chicago
precision drill
t press stan
The tool
accurately an

nsure Against...

Loss From Broken Taps!

by using

WALTON TAP EXTRACTORS

The price of a new tap is nothing, compared to the cost of removing the broken one by any other method. **WALTON BACKS** it out; saves the thread (and your time.)

Stock sizes #4 to 1 1/2" in 2, 3 and 4-flute styles. Sent on 30 day free trial. Booklet 132 gives details and prices. Write for it today.

THE WALTON CO.

98 Allyn St., Hartford, Conn.



BALL THRUST BEARINGS

Special Bearings Made to Order.

Any Quantity.

"One Bearing or One Thousand"

Your present bearings, duplicated. Send sketch of worn sample, regardless of condition, for quotation.

Catalog Upon Request.

THE G.WILLIAM CO.

358 Furman St., Brooklyn, N. Y.

APEX POWER BITS & HAND DRIVERS

FOR

PHILLIPS SCREWS & BOLTS

Apex Power Bits cover the entire range of Phillips screws and fit Electric, Air and Spiral Drivers of practically every make. Apex Bits are made of a special shock resisting steel, heat treated to give maximum life, strength and wear resistance.



Thor 3-191



No. 31 Torimeter



Thor 12-250



Apex Super Hand Drivers were developed to meet the need of a Phillips Hand Driver that would stand up when driving sheet metal and self-

driving screws. They have exceptional hardness, toughness and wear resistance.

A trial order will prove the merits of these Super Hand Drivers.

PROMPT DELIVERIES ON BOTH POWER BITS AND HAND DRIVERS.

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Drill Pro

1/4-in. dia.
drill with
sion in
range of
perman
easily car

the Del
nd of 50
pecial d
ced in c
available
s for e

chucking. The feed is controlled through a rack and pinion gear which is exceptionally sensitive. The power unit may easily be detached and used for grinding, polishing and many other applications.

"Service" Hydraulic Lift Truck

A lift truck which is completely hydraulic both in lifting and lowering has been placed on the market by the Service Caster & Truck Company, 596 N. Brownwood Ave., Albion, Mich. Elevation of capacity loads is accomplished with as little as 100 lbs. pressure on the handle and a single stroke will elevate the load sufficient for normal operation. For the full lift, additional strokes are required, the truck automatically adjusting its ratio to the load.

A 5000-lb. capacity truck, for example, placed under 2500 lbs. will lift two and one-half strokes. The same truck, without further adjustment, will lift 3500 lbs. with four strokes or 5000 lbs. with five. A variable lifting stroke allows loads to be "inched" up with short strokes or boosted quickly with long ones. The handle operates from any spot within a horizontal arc of 180 degrees. It is impossible for the handle



"Service" Hydraulic Lift Truck

to "kick back" and the handle turns with the hands, preventing blisters.

Twin roller chains, attached to double hydraulic pumps, lift the platform. The

CIRCULAR TABLE



New
Design.

High Grade.
Low Price.

For Millers, Slotters, Die Sinkers, Shapers, and Drilling Machines. Dealers write for attractive proposition and new printed matter, just off the press.

ALFRED A. TROYKE

219 E. Second St.

Cincinnati, Ohio

KUTMORE HIGH SPEED

Adjustable Hollow
Mills With
Twoway Micrometer
Adjustment

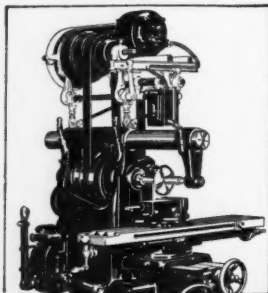
Cutting capacities
up to 2 1/2".

Ask for Catalog
No. 12.



Reisinger Mfg. Company

837 Lake Ave., ROCHESTER, N. Y.



MOTORIZE no motors to buy.

Put your idle motors to work on Remco Motor Drives. Remco's universal motor mounting will accommodate those of reasonable size. No holes to locate, or bore. Motors switched instantly, in case of a "burn out." Universal motor mounting is an exclusive Remco feature. New FREE folder. Write: Remco Products Corp., State and Hay Sts., York, Pa.

REMCO MOTOR DRIVES



For ALL Wheel Dressing Operations

The new EVER-SHARP DIAMOND TOOL is made with a long, natural shaped diamond—requires no resetting—is adapted to ALL types of wheel dressing operations—economical—accurate.

WHEEL TRUEING TOOL CO., INC.
13391 OAKLAND AVE., DETROIT, MICH.



WITH
Breuer's Ball
Bearing
TORNADO
Portable
Electric
Blower

The Most Powerful Portable Blower Ever Built—Blows Dry Air at 275 M. P. H. One small machine and attachments with tremendous power of blowing or suction—48 1/2" waterlift—completely removes dust and dirt from motors and machinery. Prevents overheating, excessive friction motor burnouts. Far superior to compressed air, and costs much less. Also sprays insecticide. Really an industrial maintenance machine of a hundred uses.

Let us show you how cleaning can be done better and at less cost. No obligation—write!
BREUER ELECTRIC MFG. CO.
5092 N. Ravenswood Ave. Chicago, Ill.

FREE TRIAL!

We'll gladly send you a Tornado for free trial to prove our claims. For prices and details of free trial offer, write.



MARVEL

HIGH-SPEED- EDGE

THIS IS THE BLADE

that made modern high speed sawing possible.

Because they are strictly high speed (have a cutting edge of 18% Tungsten High Speed Steel) and at the same time are positively unbreakable, MARVEL High-Speed-Edge Hack Saw Blades have made heavy duty, high speed, automatic production sawing machines practical. On any equipment, they permit with safety, higher running speeds and greater feed pressures, and will always assure more cuts per dollar.



WRITE
FOR
CATALOG

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"

5745 Bloomingdale Ave., Chicago, U. S. A.
Eastern Sales Office: 199 Lafayette St., New York

load is automatically locked at any height of lift. Adjustment of a foot pedal control frees the handle at any point of lift or lowers the load hydraulically. Another unusual feature is the floored-over platform which permits using the truck for other purposes than lifting if desired.

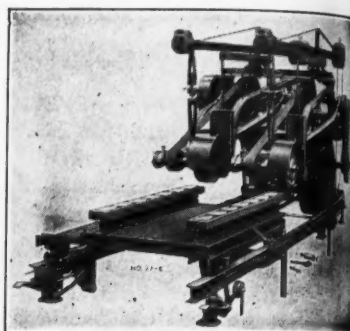
Ten-in. wheels, widely spaced in front (even on 6-in. lowered models) lend wagon-like stability and ease of movement. The truck is made in four capacities—2500, 3500, 5000 and 6000 lbs. or custom-built for any capacity up to 10,000 pounds.

Excelsior Automatic Polishing Machine

Excelsior Tool & Machine Co., Ridge Ave., East St. Louis, Ill., has placed on the market an Automatic High Speed Ball Bearing Twin Spindle Electric Sole Plate Grinding and Polishing Machine designated as "No. 27-E." The Excelsior No. 27-E Machine is said to be durable and capable of grinding and polishing economically such products as sole plates and other items of approximately the same size. The grinding operation with this machine removes scale and a sufficient amount of metal to obtain a

clean, smooth and straight surface of the electric sole plates prior to plating.

High speed, hard center grinding wheels are used the full width. These wheels are said to grind fast and



Excelsior No. 27-E Automatic Polishing Machine

for a maximum length of time. An oscillating side motion to the carriage prevents line scratches and unequal wear to the face of the grinding and polishing wheels. The holding fixtures of the

KOEBEL DIAMOND Wheel Dressing TOOLS

It Pays to Insist Upon
the GENUINE

Complete Information and
Prices upon Request

KOEBEL DIAMOND TOOL CO.
1202 Oakman Blvd. • DETROIT



Waltham, Massachusetts

**Ames
Jumbo
Gauge**
With 4 inch
dial graduated
in 1/1000".
Heavy duty.
Deep throat.
**B. C. Ames
Company**

LIKE A DOCTOR'S THERMOMETER

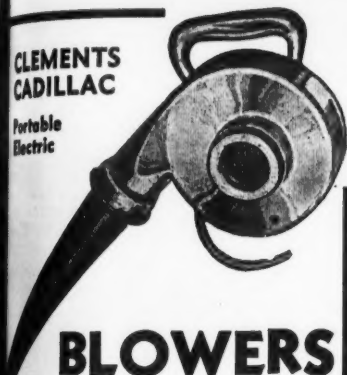
Everyone recognizes "fever," but the important thing is exactly "HOW HOT". It's the same with heat treating, metal melting, and tempering. Guesswork is certain to fail sometime. Know your temperatures. End needless waste, and excessive spoilage with a Hold-Heet Pyrometer
RUSSELL ELECTRIC CO.
338 W. Huron, Chicago, U.S.A.
Shipped prepaid to rated firms on thirty days approval.



Hold-Heet Pyrometers

**CLEMENTS
CADILLAC**

Portable
Electric



BLOWERS

and Suction Cleaners

This Portable Electric Blower is instantly convertible to a Suction Cleaner. Innumerable cleaning tasks are made easy because of its versatility, efficiency and safe method of cleaning. Fits in any light socket—no expensive installation needed.

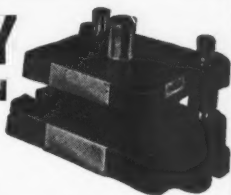
CLEMENTS MFG. CO.

6850 So. Narragansett Ave.

CHICAGO

ILLINOIS

DANLY PRECISION DIE SETS



**Danly All-Steel Sets
Danly Commercial Sets
Danly Die Makers' Supplies**

DANLY SERVICE

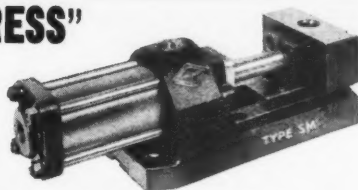
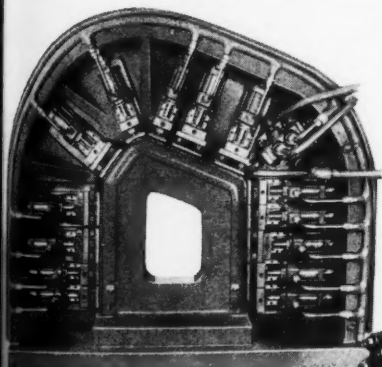
8 Danly Warehouses Provide
24-Hour Service for 85% of
All Metal Fabricating Plants

DANLY MACHINE SPECIALTIES, INC.

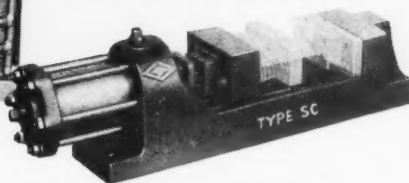
2122 South 52nd Avenue, Chicago, Ill.
513 East Buffalo Street, Milwaukee, Wis.
Long Island City, N. Y., 38-12 34th Street
Dayton, Ohio, 890 E. Monument Avenue
Detroit, Michigan, 1549 Temple Avenue
Rochester, N. Y., 16 Commercial Street
Cleveland, Ohio, 1745 Rockwell Avenue
Philadelphia, Pa., 3813 North Broad Street

**DANLY DIE MAKERS'
SUPPLIES**

PIERCING WITHOUT A PRESS"



**USE MIDWEST
HYDRO-PIERCE UNITS
EASIER—FASTER—SAFER
—MORE ECONOMICAL**



This fixture pierces R. & L. H. parts
—one in front, one in back. No chang-
ing of punches or dies.

MID-WEST PRODUCTION ENGINEERING INC.

401 E. MILWAUKEE

DETROIT, MICH.

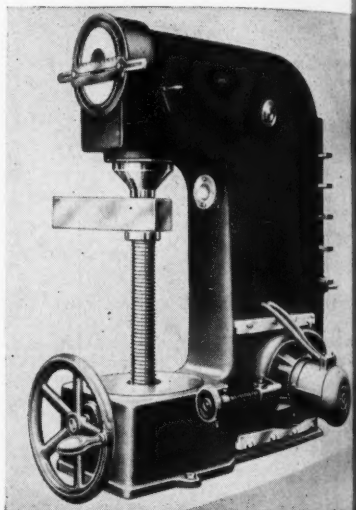
No. 27-E Machine can be readily made to suit various size castings. During the grinding and polishing operation the workpiece can be removed and replaced at the forward travel of the carriage.

The machine shown in the illustration is capable of grinding and polishing 200 sole plates $4\frac{1}{2}$ in. x $7\frac{1}{2}$ in. size per hour. The carriage travels 30 lineal ft. per minute and the spindle speed is 2500 R.P.M. for 14-in. diameter high speed grinding wheels. The spindle bearings are dustproof with oversize ball bearings. A 15 H.P., 1750 R.P.M. motor is furnished with each machine. The

weight of the entire unit is 8500 lb. and the floor space required is 17 ft. in. x 7 ft. with a total width of 7 ft.

"Reflex-Brinell" Type Hardness Testing Machine

The Reflex-Brinell Type Hardness Testing Machine illustrated has been specially developed by Herman A. H. Box 47, Station F, New York, N. Y.

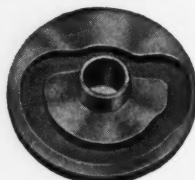


Reflex-Brinell Type Hardness Testing Machine

the application of the standard Brinell test in routine production testing of large quantities of metal sections, such as forgings, machine parts, and so on. After the standard 3000 kg testload has been lifted, the greatly magnified image

CAMS

ALL SIZES
ALL SHAPES
SPECIAL
MACHINES,
PARTS, JIGS,
FIXTURES,
TOOLS,
PRECISION
TOOL WORK
Since 1918



Varick Machine & Tool Works, Inc.
306 Hudson St. New York City

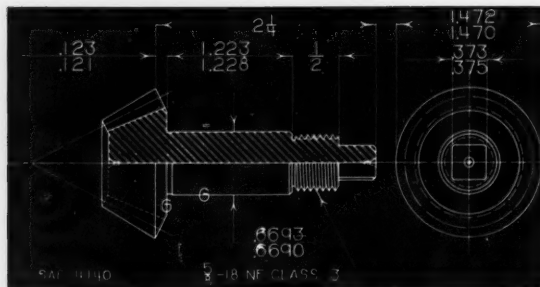
CENTERLESS GRINDING

STRAIGHT - CYLINDRICAL
SHOULDER—PROFILE
AND DOUBLE DIAMETERS

All Kinds of Materials

SCREW MACHINE PRODUCTS, HEAT-TREATED AND GROUND, IF NECESSARY
Send Blueprints or Samples for Estimates

PORTER MACHINE COMPANY
1130 PORTER AVE. CINCINNATI, OHIO



GEARS to Closer Tolerances

An example of the close tolerances held by Crofoot is shown in this bevel gear shaft drawing. Send blueprints for estimates.

CHARLES E. CROFOOT
GEAR CORP.

80 CENTRAL ST.
S. EASTON, MASS.

Janette

MOTORIZED SPEED REDUCERS 10 DIFFERENT STYLES

from which to choose the exact type of reducer to meet your individual requirements.

1/30 TO 7 1/2 H.P.

ASK FOR BULLETIN 22-25C.

Janette Manufacturing Company
556-558 West Monroe Street
Chicago

ROTARY CONVERTERS—BLOWER WHEELS—MOTOR GENERATORS

SMALL TOOLS

**Long Length Drills
Special Size Taps
Carried in Stock**

high speed and carbon drills, taps, cutters, milling cutters, hollow mills, and mills, drill rod, die sets, etc.

Send for catalog.

MAJOR MACHINERY EXCHANGE, Inc.
351 Center St. New York City



**SOCKET HEAD SAFETY HOLLOW
CAP SCREWS SET SCREWS**

**MADE OF ALLOY STEEL
MILLED FROM BAR**

*Try Them On Your Next Job!
Or Write For Samples Today.*

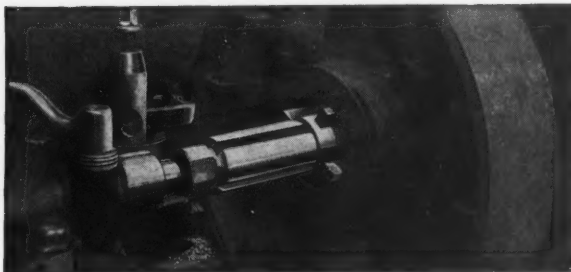
**ECONOMY
MACHINE PRODUCTS
COMPANY**

5216 Lawrence Ave., Chicago, Ill.

With NICHOLSON EXPANDING MANDRELS

are available for immediate use internal chucks for holding any hurry-up break-down. Used on lathes, grinders, cutters or millers. 1/2" to 7" in 14 sizes. Bulletin 530. Other Products: Arbor Presses, Adjustable Couplings, Steel and Stainless Ball Floats, Steam Traps and Separators, Air Separators, Traps and Vents, etc.

W.H. NICHOLSON & CO.
138 Oregon St.
Wilkes-Barre, Penna.



of the Brinell ball impression appears on a ground glass plate, in front of the operator. Limits of lowest and largest diameter permissible can be marked on the ground glass, so that the operator needs to watch only that the hardness of the section tested falls within the limits required.

Loading and unloading of test pressures is effected automatically, by electric motor drive, and test-periods are adjustable from 10 to 60 seconds each, as desired. The standard specifications of the Brinell test require the measurement of the "diameters" of the ball impres-

sions, and this automatic, motor-driven Brinell machine permits the rapid and fine production Brinelling with the results obtained on basis of the impression diameters.

Allis-Chalmers 2-3-4 Single Groove Adjustable Sheave

The Texrope Division, Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has developed something new: an Adjustable Texsteel Sheave, truly combination sheave for double and



Allis-Chalmers 2-3-4 Single Groove Adjustable Sheave

This sheave has a range of pitch diameter varying from 2 to 3 in. and from 3 to 4 in. by merely removing the adjustable plate, reversing and again placing on the hub.

COLUMBIA LOCK-NUTS



Makers of
LOCKNUTS
NUT-LOCKS

for every use
since 1900

Ask for Catalog

COLUMBIA NUT & BOLT CO., Inc.
Bridgeport, Conn.

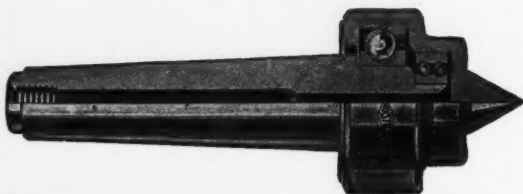
CENTERLESS GRINDING

Accuracy—Prompt Service

Commercial Centerless Grinding Co.

6538 Carnegie Ave., Cleveland

STURDIMATIC LIVE CENTER for LATHES, GRINDERS and MILLING MACHINES



STURDIMATIC TOOL COMPANY

It turns with the work. Eliminates friction of dead center. Lowest possible overhang prevents vibration and chatter.

Write for Catalog and Free Trial Offer.

5222 Third St., Detroit, Mich.

HEAVY **AUTOM** DUTY

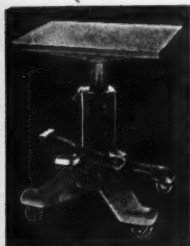
**A HEAVY HINGE
FOR HEAVY DUTY**
Stocked in 7 ft.
lengths, 3" and 5"
when wide open.
Special lengths and
widths to order.

For details write:
**AUTO MOULDING
& MFG. CO.**
HINGE DIV.
2326 S. Canal St.
CHICAGO

Continuous Hinge No. 290



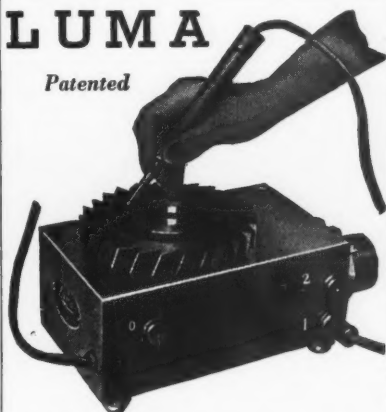
THE NEW DEVELOPMENT IN PORTABLE LIFT TABLES



A 1000 lbs. Midwest Hydraulic Portable
Lift Table is now available.
Solid construction, light in weight, and low
cost. 24"x24" table, operated between
minimum height to 40" maximum height
from the floor.
Model size to suit your requirements.
In 1000 Lbs. or 2000 Lbs. hydraulic Lift
will eliminate the following.
1. Congestion on your over head crane.
2. Heavy lifting by 3 or 4 men.
3. One man on machines.
4. Haphazard moving of work.
5. Grouping of men to move heavy dies or
equipment.
Send for our illustrated circulars.
Midwest Tool & Engineering Company
112 Webster Street
Dayton, Ohio

L U M A

Patented



Combination Demagnetizer and Electric
Etching Pencil. Marks symbols in
hardest steel. Demagnetizes instantly.
One of our models popular in tool
rooms for 15 years.

Luma Electric Equipment Co.
DEPT. MS
TOLEDO, OHIO

"OUTWEARS

the best

Bronze Metal"

20 years



without
a drink—

ARGUTO OIL-LESS BEARING CO.

Wayne Junction, Philadelphia, Pa.

September, 1938

MODERN MACHINE SHOP 181

As shown in the picture, the outer plate in the position shown at left allows the Texrope Belts to ride high and give a pitch diameter anywhere from 3 to 4 in.; the outer plate reversed in the position shown at the right allows the Texrope Belts to ride low and give a pitch diameter anywhere from 2 to 3 in.; the two together providing for a speed variation of 100 per cent. This change takes but a moment.

The sheave has been developed in response to a demand for a sheave that is low in cost and yet has a wide range of speed variation. It is especially well suited to the heating and ventilating industry. This sheave makes use of the now famous Duro-Brace principle of construction.

Speedway No. 250 Home Drill and Grinder Kit

Intended for use where the service is intermittent, Speedway Manufacturing Company, 1825 South 52nd Ave., Cicero, Ill., has brought out the No. 250 Home Drill and Grinder Kit shown in the illustration. The kit consists of a miniature 1/4-in. drill, hand grinder and five accessories. Small in size and light in

weight, the tools were originally intended for use by the home craftsman.



Speedway No. 250 Home Drill and Grinder Kit

but have found their way into manufacturing plants.

The drill is designed to operate



TRUMORE Diamond Tools

Durable diamonds in
Nickel Alloy Mounting
Reduces truing costs.

Send for new catalog.

F. F. GILMORE & CO.

112 DARTMOUTH ST.

BOSTON

YOU'LL SAVE TIME

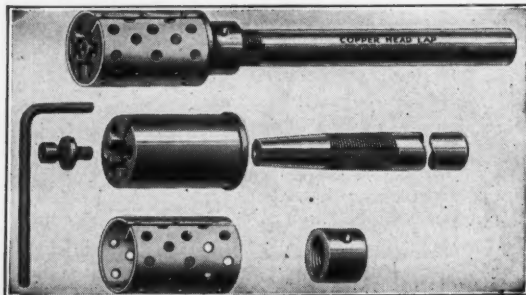
AND TROUBLE... BY
SPECIFYING NATIONAL
TWIST DRILLS, HOBBS,
REAMERS... MILLING
CUTTERS, Special TOOLS



NATIONAL TWIST

DRILL AND TOOL CO.

DETROIT, U.S.A.
Top and Die Division, WINTER BROS. CO., Waukegan, Ill.
Factory Branches: New York, Chicago, Philadelphia, Cleveland
Distributors in Principal Cities



LOWER YOUR LAPPING COSTS

With Copper Head Expansion Lapping
Profitably used in hundreds of
lapping shops. Available in sizes
from 1/2" to 2 1/2", graduated by sixteenths
of an inch.

Many other designs for special
applications.

Write for Bulletin
BOYAR-SCHULTZ
CORPORATION

2120 Walnut Street, Chicago, Ill.

originally
me crafts



MADE TO TAKE PUNISHMENT

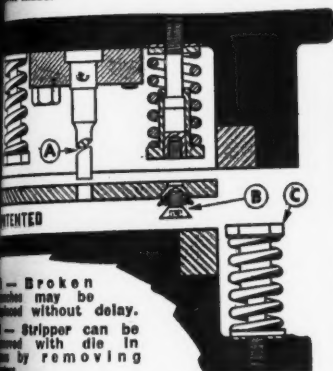
THOR STAMPS are made of special, tough alloy steel—correctly hardened to withstand any punishment you can give them. They give clear, uniform marks—for a long time.

Send for a few trial stamps—punish them—see how they take it. Write today.

THE PITTSBURGH STAMP CO., 812 Canal St., Pittsburgh, Pa.

STRIPPIT

most dependable and economical stripping machine made.



- Broken strips may be removed without delay.
- Stripper can be changed with die in place by removing nut.
- No stripper plate required for stripping—strippits alone will strip it.

Write for catalog.

THE STRIPPIT CORPORATION
559 Niagara St. Buffalo, N. Y.
Wales hole-punching and notching dies.

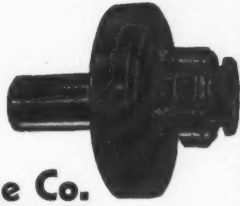


"EDGEMONT" SERVICE TESTED FRICTION CLUTCHES

DISC "TYPE SF"

For the most severe jobs this clutch has won the unqualified approval of maintenance men. Its ability to stand up and take it is ample reason for giving it a trial on any drive. For high or low speed, easy or hard applications the "Type SF" is superior. Send now for circular showing the wide range of sizes.

The Edgemont Machine Co.
2100 HOME AVE. DAYTON, OHIO



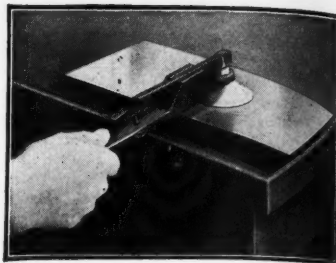
UR
STS
Lan
s of
sized
attac
special
sin
TZ
N
Chicago

er, 193

1000 r.p.m. and is rated for $\frac{1}{4}$ in. in steel. The grinder operates at 20,000 r.p.m. In design and finish these Speedway miniatures are strictly modern with streamlined bodies finished in blue crackle enamel and die cast white metal ends and trim. The steel case which comes with a carrying handle is blue enameled to match.

Ipcos Safety Vacuum Lifter

Sheet metal blanks can be lifted, fed, or positioned in stamping presses without danger to the hands or fingers of



Ipcos Safety Vacuum Lifter



GEARS IN STOCK

Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 80.

CHICAGO GEAR WORKS

769-773 W. Jackson Blvd., Chicago, Ill.



Standardized JIG BUSHINGS
Acme Standard over 6700 Items
A.S.A. Standard over 4200 Items



Acme Drill Jig Bushings are made by the most exacting, scientific methods—insuring long wear, accurate fit, and absolute satisfaction. A standardized product, carried in stock for prompt delivery in over 10,900 standard items—all completely finished and ready for use. Special sizes made to order.

Send for bulletin, containing complete details, sizes available and low prices.



ACME INDUSTRIAL COMPANY

212 N. Laflin St., Chicago, Ill.

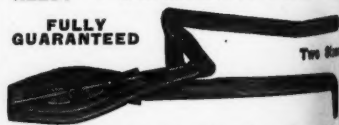


Williams Torque "Measurrench"

A unique and simple tool for measuring right-hand turning torque has been announced by J. H. Williams & Co., 75 Spring St., New York, N. Y. Known as the Williams Torque "Measurrench" No. B-21, the tool is equipped with various sizes of detachable sockets

ALL ALLOY PORTABLE SHEARS

FULLY GUARANTEED



No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{1}{4}$ " steel plate.
Special Blades for shearing stainless steel.

BREMIL MFG. CO.

1725 PITTSBURGH AVE.

ENIE, PA.

bits for servicing hollow-screws having 5/16 in. hex drive-opening. Its purpose is to enable the operator to avoid injury to hollow-screws and to



Williams Torque "Measurrench"

socket bits by over-tightening. The Measurrench is calibrated with numbers corresponding to numbers of the various size bits which it accommodates. When the "Index Line" on the bar touches the line indicating the piece number of the Williams bit in use, the proper load has been applied to the hollow-screw.

Since the head may be moved along the bar, the tool may be used without the measuring feature.

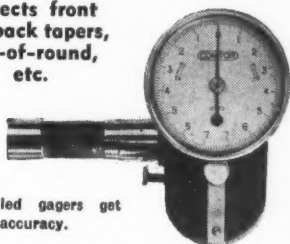
Sac Tube Shaping Tool

A tool with which copper, aluminum, or soft temper tube can be bent, cut, flared or swaged, has been brought out by Sac Tool Manufacturing Co., 1907 Washington Ave., St. Louis, Mo. The tool can be used to make coils and fittings and reducers or increasers. Dupli-

Positive automatic 2-point gaging to .00005".

COMTORPLUG

Detects front and back tapers, out-of-round, etc.



Unskilled gagers get same accuracy.

Used for production and inspection gaging by airplane, automotive, electrical, machinery plants, users of ball bearings.

BULLETIN 25 GIVES FULL DETAILS

THE **COMTOR** CO.

Waltham, Mass.

Est. 1928

New Nesting Type Tote Pans



Lots of 50
\$1.00 each

20" long x 12" wide x 6 1/2" deep.
16 ga., drag holes and handles both ends.

Lots of 100 & 200 less 3%; 300 up less 5%

J. L. LUCAS & SON, INC.

1 Fox Street Bridgeport, Conn.

MACHINISTS, Tool, Die



and Pattern Makers
—It's no mystery why GERSTNER Tool Chests last longer and serve more satisfactorily: They are made better! Free Catalog for Machinists, Tool, die and Pattern Makers.

GERSTNER TOOL CHESTS

1238 Columbia St., Dayton, Ohio.

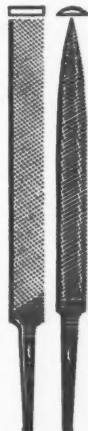
SPECIFY ALLIGATOR



TRADE MARK

FILES . . .

Speed up production . . . the right file for the job will save time and money. Alligator Brand Files are available in a complete line of American and Swiss Patterns in all shapes, sizes and cuts to fit every filing need. Passing the highest tests, as to shapes, cutting quality and uniform hardness, they are guaranteed perfect in every detail. Write for catalog and prices.



CARSON-NEWTON CO.

61 71 MILL ST.

BELLEVILLE, N. J.

cate bends can be made by using straight slides which are marked to show the length of the tube required to make the bend. Circular blocks are adjustable to



Sac Tube Shaping Tool

allow the bend to be made back of the flare nut which is placed on the flared tubing with the flare nut held in the vise jaws. When a swedge is required at the end of the bend, the swedge is held in the vise jaws by placing a straight tip in the swedge and starting the bend at the desired point.

One tip is used for all sizes of flares,

with a separate tip for each size swedge.

Lincoln Park Carboly Thread Gage

The Lincoln Park Tool and Gage Company, 1719 Ferris Ave., Lincoln Park, Mich., is now marketing thread plug gages in which the threads are ground in Carboly cemented carbide.

The illustration shows two thread plug gages which are representative of two orders recently completed by the company. The larger gage was manufactured for a well-known camera manufacturer for use in gaging the threads in a camera shutter case. The threaded portion is a shell of Carboly cemented carbide brazed to a steel shank. The diameter of this gage is 3/4 in. (1-15/32 inches), with 50 pitch threads. The small gage is of 1/8 in. diameter and is now being used for gaging threads by a large business equipment manufacturer. The threaded portion of this gage is solid Carboly and is butt brazed to a standard gage shank. It has 44 threads.

The Lincoln Park Tool and Gage Company is equipped to produce Carboly Thread Plug Gages in larger sizes



REED MICROMETERS
Extremely Accurate and Serviceable. Manufactured under same management for 30 years. Made in 1" to 6" Outside and 1 1/2" to 32" Inside Sizes. To read in thousandths or ten thousandths. Also Depth Gauges and Micrometer Sets. Discounts and Catalogue Furnished on Request.

REED KNURLS

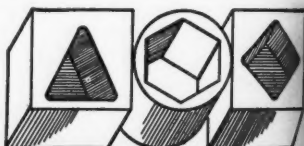
150
STYLES
& SIZES

QUICK
DELIVERY



Highest quality, accurately cut Standard Stock Knurls ready for immediate shipment. Reed Special Finishing Process after hardening insures longest wearing Knurls producing best work. Special Knurls made to specification. Send for Circular.

REED SMALL TOOL WORKS
40 Dewey Street Worcester, Mass.

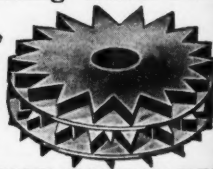


DRILL THESE HOLE

By a Quick, Easy, Inexpensive Method
Your business letterhead will bring literature
WATTS BRO. TOOL WORKS
Wilmerding, Pa.

Grinding Wheel Dressers

We make
all types
of
Dressers
and
Cutters



DESMOND-STEPHAN MFG. CO.
URBANA, OHIO
The Canadian Desmond-Stephan Mfg. Co. Ltd.
Hamilton, Ontario, Canada

ach size smaller sizes than the two examples illustrated, and can produce both finer and coarser thread pitches. This company guarantees that any degree of accuracy which can be secured in thread



Lincoln Park Carboly Thread Gage

and Grinding in steel can be equalled in the methods which they employ in grinding larger threads in Carboly cemented carbide.

Gammons

REAMERS

AND

END MILLS

ORDERMATORS of the Helical Taper Pin Reamer Special Reaming Problems Invited Immediate Shipment on Stock Tools

SEND FOR CATALOG Dept. G

SPIRAL SPECIALISTS

THE GAMMONS-HOLMAN CO. MANCHESTER, CONN.

"STANDARD"

DIAL BORE GAGES

Measure Diametrically Through Center of Bore-The CORRECT Way

Standard Length Type—for measuring the usual variety of bores. Available with length extensions for shallow, medium or deep bores.

PISTOL GRIP TYPE

for use in restricted quarters. Dial can be swung to any angle suitable to the operator.

Left — Vertical Type: Clear view of dial when used in vertical position.

Right — Vertical 90° Type: Dial viewed from end of gage.

WRITE FOR CATALOG

For Accurate Gaging Come To "Standard."

STANDARD GAGE CO., INC.

POUGHKEEPSIE, NEW YORK

Binrack Assembly Equipment

To provide for compactness, order and convenience on assembly operations, the Binrack Assembly Unit shown herewith



Binrack Assembly Equipment

has been designed by The Gordon L. Hall Co., Old Lyme, Connecticut.

Each bin is formed of a single piece of metal and is curved at the back to form a hook which locates it firmly in

any position in the rack. Edges are folded at the front for safety. The bins are designed to rest in the racks with a forward tilt so that parts will gravitate toward the front. All standard bins

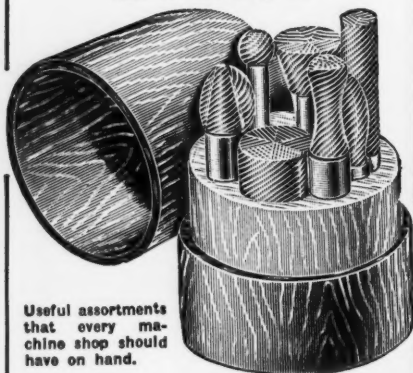
are identical in depth and front-to-back dimensions, although being designated by widths and lateral space occupied in the racks. Hopper-type bins are made in 8-in. and 4-in. widths only and can be used for increased parts capacity in the top tiers of the rack.

Standard racks are made in 16, 12 and 8-in. lengths and admit of a large variety of arrangements in combination. The racks are ruggedly constructed of steel rods riveted between sheet metal ends. The standard construction permitting the use of three tiers of bins. Each rack is 8 in. high and 12 in. in depth. Any standard bin fits any rack in any position and bins can be used in any desired combination.

Mention MODERN MACHINE SHOP when writing to advertisers. Your cooperation will be appreciated both by the advertiser and this magazine.

GROBET Hand Cut ROTARY FILES ARE THE BEST

Ask for Catalog KR



Useful assortments that every machine shop should have on hand.

Grobet File Corp. of America
3 Park Pl. New York

PRECISION BORING



Easy and Economical with Flynn Micro-meter Boring Heads.

For large and small holes. Bar capacity 3/16" to 1 1/2" diameter.

Write for catalog

FLYNN MFG. COMPANY
437 Bates St., Detroit, Mich.

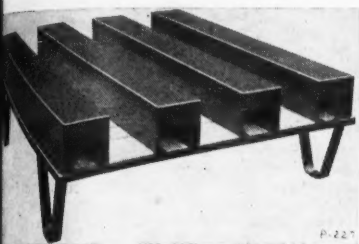


PRESSES
FEEDS
AUTOMATIC
EQUIPMENT

THE V & O Press Co.
HUDSON N. Y.

Yale Special Design Lockweld Platform

Designed for use with the electric truck-type truck, the truck platform illustrated has been brought out by The



Yale Special Design Lockweld Platform

Yale & Towne Mfg. Co., Philadelphia. The standard platform proper is of welded design with channel side members, angles for end board protection, and bars for legs and oak boards in the deck.

The leg bars project upward through the side channels and boards and are welded to two extra angles running

In BOSTON



Hotel Kenmore

Commonwealth Ave. at
Kenmore Square

- All Rooms with Tub and Shower Bath
- Air Conditioned Dining Rooms
- Ample Parking Space
- Rates from \$3.50

Write for historical map of Boston.

L. E. WITNEY, Managing Director

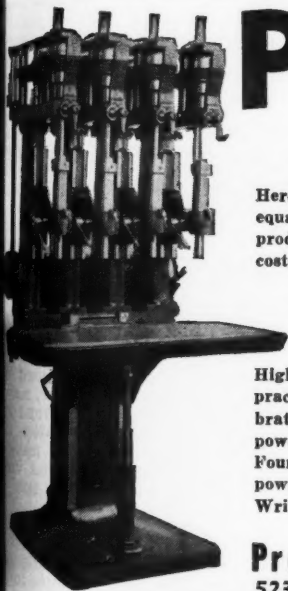
PROVIDENCE PRECISION DRILLS

Here are tools of true PRECISION quality, at no extra cost—equally well adapted to the finest toolroom work and to quantity production. Powerful, speedy, sensitive—they will reduce your costs by giving you THE LEAST COST PER HOLE.

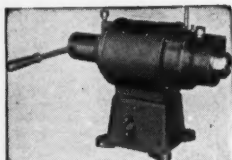
BALL BEARING THROUGHOUT

High grade ball bearings at EVERY ROTATING POINT practically eliminate wear—increase sensitiveness—prevent vibration and chatter—maintain accuracy and rigidity—save power—simplify lubrication—assure PRECISION results Four models, 1 to 6 spindles—belt or motor driven—hand or power feed—for drilling, boring, tapping or reaming. . . . Write for the Bulletin.

Providence Engineering Works, Inc.
523 SO. MAIN ST. PROVIDENCE, R. I.



IDEAL SPEED LATHES



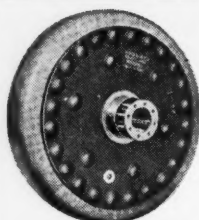
**FOR LAPPING
FINISHING
POLISHING
SMALL PARTS**

2 Speed Motor.
Automatic Brake.
Collet or 3 Jaw
Chucks. Hand
operated or auto-
matic. Write for
Cir. 351.

SCHAUER MACHINE CO.

2060 Reading Rd.

Cincinnati, Ohio

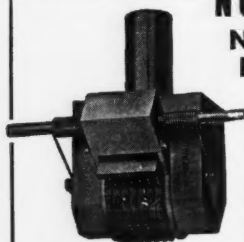


Heavy Duty
Hyatt Roller Bearing

**SAVE YOUR FLOORS
RE-WHEEL YOUR
TRUCKS WITH
END-WOOD
WHEELS**

Easy Rolling
Long Wearing
Sizes for all trucks.
Casters for all
purposes.
Full information
Free.

METZGAR CO.
112 Logan St. S.W.
Grand Rapids, Mich.
U. S. A.



Automatic No. 50

STAMP

Name plates,
steel and other
metal parts,
tools, metal
checks, badges,
etc.



Quick
Change

Write for
latest
literature
and prices.



Platform
No. 45

NUMBERALL STAMP & TOOL CO., Inc.
Huguenot Park, Staten Island, N. Y.

NUMBERALL NUMBERING MACHINES

For Hand, Bench or
Press use. All sizes,
1 to 10 wheels
standard. Special
machines built on
order. **FASTER**
than Single steel
stamps or gang
holders. No Type
to lose.

across the platform, thus providing rigidity for the entire unit. The steel runners bolted to the deck are 7 1/2 in. wide and spaced 8 in. apart. They can be removed to permit the platform to be placed in regular service.

BOOKS

Instruments of Precision. Sixty-four pages of descriptions and illustrations of the precision instruments made by The Gaertner Scientific Corporation, 1200 Wrightwood Ave., Chicago, Ill., are contained in Catalog M-138.

Instruments presented include reading microscopes, micrometer microscopes, microscope accessories, micrometer eyepieces, micrometer slides, microscope supports, spherometers, test plates, telescopes and supports, reading scales, cathemeters, standard meters and scales, levels, measuring microscopes, comparators, creep test instruments, dividing machines, and interferometers.

Copy free to any mechanical executive upon request.

S. S. White Engineering Bulletin No. 38. This booklet, now being issued by S. S. White Dental Mfg. Co., Room 23106, 10 East 40th St., New York, N. Y., presents information and data about the use of flexible shafting for remote controls. General uses suggested for flexible shafting for remote control are: centralizing machine adjustments and controls at a single point convenient to the operator; operating from an accessible point, switches, valves and other electrical and mechanical controls located in remote or inaccessible positions; operating any element requiring rotation or push-pull movement or both; operating indicators and indicating devices of all kinds; protecting operators by providing controls free from mechanical or electrical hazards, and coupling by the use of short lengths of shafting for carrying controls around bends or obstacles, or to avoid the necessity for accurate alignment of moving parts. A list of actual applications of flexible shafting is given.

Photographs and drawings are used to supplement the descriptive matter, making available to the engineer a fund of valuable and interesting information. A copy of Bulletin No. 38 will be mailed to any mechanical executive who will address a request on his business letterhead, giving his title.

New Method Steel Stamps are the subject of a four-page folder now being issued by New Method Steel Stamps, Inc., 149 Jos. Campau, Detroit, Mich. The

viding rig-
steel run-
1/2 in. wide
ey can be
orm to be

ifferent types of stamps, which are
available in a number of type faces, are
illustrated and described. The company
is equipped to take care of any mark-
ing problems and design special stamps,
holders or holders for any purpose.
Copy of Bulletin No. 113-1 free upon
request.

Sixty-four
illustrations of
by The
ion, 1261
are con-

Screw Driver Bits and Socket Wrench
Shanks. Complete specifications on bits
for driving slotted head and Phillips re-
cess-head screws and on socket wrench
shanks and socket wrenches for all
types of bolts and nuts, are presented
in a catalog and reference manual is-
sued by the Independent Pneumatic
Tool Co., 600 W. Jackson Blvd., Chicago,
Ill. This attractive 24-page book,
known as Catalog No. 70, describes bits
and shanks for use with all models of
screw drivers and other makes of power screw
drivers and nut setters.

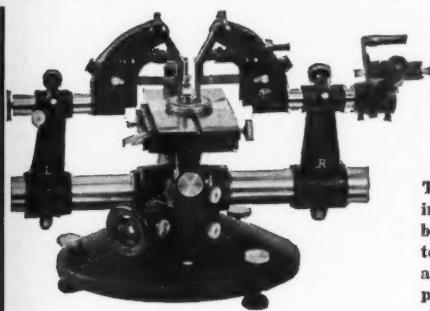
Fully illustrated with application pic-
tures of tools in use on various kinds of
work and with detail drawings of the
bits, shanks and socket wrenches, the
manual gives the experienced plant ex-
ecutive all the information he wants in
convenient, concise form. A copy is
available to users of power screw drivers
and nut setters on request.

Bulletin No.
issued by
Room 23106,
N. Y., pre-
sents about the
remote con-
trol for flexible
microscopes:
centralized con-
trols for the op-
erating point,
electrical and
in remote
controlling any
push-pull
indicators;
controls for
electrical har-
monics of short-
circuiting con-
trols to avoid
overheating of
lamps. The ap-
plication is
given.
The sub-
ject matter, mak-
ing a fund of
information. A
copy will be
mailed to
who will
less letter-



20 STORIES
of Comfort
IN DOWNTOWN
DETROIT
810
OUTSIDE
ROOMS
Hotel
BARLUM
CADILLAC SQUARE
AND BATES STREET

ALL WITH
BATH
from **\$2.00**
DAILY



Horizontal Optimeter set up for
checking a ring. Object table
can be raised and lowered for
checking taper errors. Table can
be tilted to set cylinder at right
angles to measuring axis.



ZEISS HORIZONTAL OPTIMETER

The most versatile measuring machine for
inspection of products, tools and gauges,
by comparison with master gauges. Ex-
ternal and internal measurement of plain
and threaded work. Constant measuring
pressure; accurate repeat readings to
.00005 in. Projection attachment for
greater convenience of reading. Colored
tolerance marks for repetition work. Quick
and reliable operation. This machine can
also be converted into a direct measuring
machine, eliminating reference to gauge
blocks.

Catalog Fo 118 free upon request.

Carl Zeiss, Inc., 485 Fifth Ave., New York
728 So. Hill St., Los Angeles
Representatives in Principal Cities

the sub-
being in-
amps, Inc.
tich. The

ber, 1933

"Cincinnati" 12 and 16-Inch Universal Grinding Machines are the subject of an eight-page circular issued by Cincinnati Grinders, Inc., Cincinnati, Ohio. The cost reducing features are outlined and general machine specifications are given. In addition to general views of the grinders, the folder contains illustrations and descriptive material on the wheelhead, heavy one-piece bed, fixed type internal grinding attachment, hinged type internal grinding attachment, and built-in electrical controls. Copy of Bulletin G-414 free upon request.

Push Button Stations. "Type HD Heavy Duty Push Button Stations" is the title of a leaflet published by Westinghouse Electric & Manufacturing Company. These heavy duty push buttons are available with a mushroom type of operating head for application in places where usual shrouding of button is not desirable. Copies of the leaflet may be secured from any district office of Westinghouse Electric & Manufacturing Company, or from headquarters at East Pittsburgh, Pennsylvania.

Pictorial News of Industries with Niagara Machines. This attractive circular is filled with illustrations of Niagara presses, shears and machines for sheet metal working in use in many branches of the metal-working industry. Operations include shearing, blanking and drawing and forming of plate and sheet metal sheets. Copy free by addressing Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, New York.

Olsen Hardness Testing Equipment. Bulletin No. 1 presents the various types of hardness testing machines and instruments manufactured by Timm Olsen Testing Machine Co., 500 N. Twelfth St., Philadelphia, Pa. The instruments described and illustrated include a number of motor-driven and hand-operated Brinell hardness testers, a special microscope for Brinell hardness testing, the Herbert Pendulum Hardness Tester, the Ballantine Hardness Testing Machine, and the Olsen Baby Brinell Tester. Directions for operating the various models are given. Copy free to any mechanical executive upon request.

Crashing in with Hack Saw Results

"HIGH SPEED"
"TUNGSTEN"

"MO-SPEED"
"SUPERFLEX"

AMERICAN SAW & MFG. CO. Springfield, Mass.

LENOX

tries with
active cir-
cations of
machines for
in many
g industry,
blanking,
plate and
ee by ad-
Tool Works,
New York.

Equipment.
ne various
chines for
by Timine
500 N.
The in-
strated in-
riven and
ss testen
ell hard-
Pendulum
ine Hard-
the Olsen
s for op-
are given
executive

"Years Ahead" is the title of a color-illustrated bulletin which describes the advantages and features of the segment and clutch-type spring making machines manufactured by The Torrington Manufacturing Company, Torrington, Conn. Specifications for each type of spring making machine are shown in table form. Copy free upon request.

Lands 12-Inch Type C Hydraulic Universal Grinders are described and illustrated in an attractive 12-page booklet, designated as Catalog J-138. The various parts of the grinders are explained in detail and a number of typical operations are presented. A listing of the standard equipment and specifications is also included. Copy free upon addressing Lands Tool Company, Sayreboro, Pennsylvania.

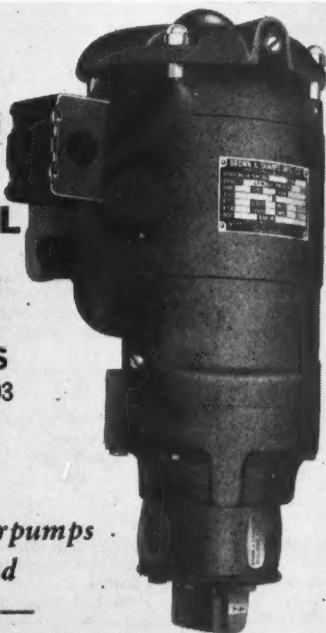
Hannifin "Allen" Riveters. Bulletin No. 48, published by Hannifin Manufacturing Company, 621 Kolmar Ave., Chicago, Ill., contains 16 pages of descriptions and illustrations covering the four general types of Hannifin "Allen" pneumatic Riveters. The four types include jaw riveters, compression lever (pinch bug) riveters, alligator riveters, and lattice riveters. One section is devoted to Hannifin "Allen" Hydraulic Jaw Riveters and "Hy-Power" Hydraulic Riveters. A listing of Hannifin pneumatic and hydraulic equipment for production operations is also given. Copy free upon request.

Mention MODERN MACHINE SHOP when writing to advertisers.

Niagara Power Rotary Shears. Bulletin No. 70-D, published by Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y., gives complete up-to-date information on the Niagara line of power-operated circle shears, ring and circle shears, and flangers. It is claimed that the adaptability of these machines frequently enables manufacturers to eliminate the cost of an expensive investment in dies for such operations as cutting fan shrouds, making airplane parts, steel drums and containers, and many other similar jobs. Copy free to plant executives upon request.

VERTICAL MOUNTING - - as well as HORIZONTAL

in the 3 sizes of
**Rotary Geared
MOTORPUMPS**
Nos. 101, 102 and 103



— Specify Motorpumps
for Flexibility and
Economy. Write —

Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

BROWN & SHARPE PUMPS



FOR YOUR CATALOG LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. **Shaper**
Atlas Press Co., 746 N. Pitcher St., Kalamazoo, Mich., has issued a new 8-page Catalog No. 30 which completely describes and illustrates the new Atlas Shaper.
2. **Universal Grinding Machines**
A new bulletin, G-414, which illustrates and details the New 12" and 16" Cincinnati Universal Grinding Machines, has been issued by Cincinnati Grinders Incorporated, Cincinnati, Ohio.
3. **Flame Cutting**
Joseph T. Ryerson & Son, Inc., with offices in principal cities, has published a new 4-page bulletin showing typical applications of Ryerson Flame Cutting Service.
4. **Universal Grinders**
Catalog J-138, featuring Landis 12" Type-C Hydraulic Universal Grinders has just been released by Landis Tool Co., Waynesboro, Pa.
5. **Free Cutting Steel**
Inland Steel Co., 38 South Dearborn St., Chicago, Ill., now has available a bulletin announcing Inland Ledloy, the new lead-bearing open hearth free cutting steel.
6. **Oilless Bronze Bearings**
Metaline Oilless Bronze Bearings are classified and illustrated in a 4-page folder published by R. W. Rhoades Metaline Co., Inc., Long Island, N. Y.
7. **Motor-Starting Switch**
Features of the General Electric Manual Motor-starting Switch for control of fractional-horsepower motors are reviewed in bulletin CR1061. General Electric Co., Schenectady, N. Y.
8. **Graph Sheets**
Keuffel & Esser Co., 127 Fulton St., New York, N. Y., have published a 88-page catalog on graph sheets, coordinate papers and cloths.
9. **Metallographic Equipment**
Catalog E-225, featuring metallographic equipment and accessories, has just been released by Bausch & Lomb Optical Co., Rochester, N. Y.
10. **Arc Welder**
A new 6-page folder illustrating and describing the New Hobart Multi-Range Arc Welder is available from Hobart Brothers Co., Troy, Ohio.
11. **Plain Grinding Machines**
Nos. 20 and 22 B & S Plain Grinding Machines are detailed in a new 8-page folder issued by Brown & Sharpe Mfg. Co., Providence, R. I.
12. **Precision Boring Machines**
The Stokerunit Corporation, 4540 W. Mitchell St., Milwaukee, Wis., has issued an 8-page bulletin on Precision Boring Machines.
13. **Roller Bearings**
Bulletin No. 14 released by The Helm Co., Fairfield, Conn., gives complete specifications and engineering data on Helm self-contained roller bearings for all radial installations.
14. **Hole Gage**
Bulletin 25 illustrates and describes the Comtorplug for production gaging of holes to close tolerances. The Comtor Co., Waltham, Mass.
15. **Block Type Boring Equipment**
Bulletin No. 300 illustrates and describes the Block Type Boring Tool Equipment manufactured by the Davis Boring Tool Co., 6200 Maple Ave., St. Louis, Mo.

Reamers and End Mills

Gammons reamers and end mills are available for selection from Catalog G. The Gammons-Holman Co., Manchester, Conn.

Screw Machine Collets

Sutton Diamond Grip Collets are completely reviewed in an attractive catalog released by Sutton Tool Co., 2842 W. Grand Blvd., Detroit, Mich.

Rapid Indexing

The Hartford Superspacer for fast, accurate indexing is described in a folder released by Hartford Special Machinery Co., Hartford, Conn.

Balancing Ways

A bulletin outlining various sizes of Anderson Balancing Ways has been issued by Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill.

Disc Sanders

The Delta Manufacturing Co., 601 E. Vienna Ave., Milwaukee, Wis., has issued literature on metal-finishing equipment including Delta Belt Sanders and Delta Disc Sanders.

Walton Tap Extractors

Walton Tap Extractors are now available in sets of 4, 5, or 6 extractors, packed in polished wood cases. A bulletin now being issued by the

Walton Company, 94 Allyn St., Hartford, Conn., gives full details.

22. Speedmill-Midgetmill

Dalrae Tools Co., 501 E. Water St., Syracuse, N. Y., is issuing a 16-page catalog featuring the Speedmill and Midgetmill motor driven attachments for all milling machines.

23. Surface Grinder

The New Reid hand feed surface grinder is detailed in Circular 2-A released by Reid Brothers Co., Inc., Beverly, Mass.

24. Clutches

Complete information about Pullmore Clutches is contained in the Pullmore Blue Book published by the Rockford Drilling Machine Co., 300 Catherine St., Rockford, Ill.

25. Gear Cutter

The Fellows Gear Shaper Co., Springfield, Vt., has available a new bulletin, detailing the gap-type cutter method for producing accurate gears at low cost.

26. Drill and Jig Borer

A new 16-page catalog is being issued by The Fosdick Machine Tool Co., Cincinnati, Ohio. It illustrates and describes the Fosdick Combination Drill and Jig Borer.

Print plainly in filling out coupon for literature.

MODERN MACHINE SHOP

431 Main St., Cincinnati, Ohio

I am interested in receiving the following literature reviewed in your September issue.

No. No. No. No. No.
(Insert numbers denoting literature you want.)

Name. Title.

Company.

Company Address.

City. State.

Fulton B.
ublished in
sheets, co.
ns.

t
g metallic
accessories
y Bauch &
ester, N. Y.

trating and
art Multi-
lable from
Ohio.

ain Grind-
in a new
Brown &
ce, R. I.

n, 4548 W.
Wis., has
on Pract-

The Helm
complete
ring data
ller bea-
tions.

describ
roduction
olerance
Man.

ent
and de-
ing Tool
by the
00 Map

er, 1938



Shaper Super-Sealed Roller Bearing Pillow Blocks, which are designed for unusually severe dirt conditions such as exist in foundries, cement mills, grinding and crushing equipment, and so on, where the air is filled with abrasive material, are described in a four-page folder issued by Shafer Bearing Corporation, 35 E. Wacker Drive, Chicago, Ill. Copy of Bulletin 521 free.

Century Automatic Start Induction Polyphase Motors. This folder contains illustrations and descriptions of the Century Automatic Start Induction Polyphase Motors manufactured by Century Electric Company, St. Louis, Mo. These motors are of the general purpose type suitable for applications requiring high starting torque with low starting current. Copy free upon request.